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Some good ideas about railroad discipline are printed in another column of this issue, in the shape of a Chicago & North-Western committee report. The most novel points are (1) don't trust to references if you wish to be sure of an applicant's qualifications; (2) have question boxes, so that employees can expose bad practice without giving their names; (3) have "authorities" make addresses before meetings of employees. Not only these new ideas but the old ones as well, are eminently sound; and the chief thing to be said about the report is that it ought to be carried out energetically on every important railroad. We are sorry to head the article "Good Ideas" instead of "Good Practices"; but we are so skeptical that we are extremely conservative on this subject. If this is a sinful slander on our North-Western friends we beg their forgiveness; but railroad officers' ideas of what good discipline ought to be are so much higher than actual railroad discipline in practice—except for short periods—that on the general proposition it is always very difficult to form a satisfactory diagnosis. The general superintendent who has good ideals is unable to infuse the minds of his division officers with the necessary enthusiasm. If the division men have energy and originality they may want to pursue different plans, endangering the policy of the company as applied to all divisions. The division superintendent who lays out a comprehensive plan sometimes has clear sailing except that he finds himself unable to get the authority for the necessary expenditures. Where all the superintendents work together harmoniously the resignation or promotion of two or three of them is likely to make as much trouble as a slump in Wall street. The only thoroughgoing and successful schemes of discipline have been those which have been continued on a consistent plan for several years, and *by the same officers.* When the Wall street slump comes in reality, good and bad plans alike are suffocated. With slack business and the less competent men got rid of, will not things run along pretty well without the strenuous supervision which the theorists demand? The answer to this question is affirmative. The trouble is in being satisfied with "pretty well." Financially, that may be called a satisfactory result. By the superintendent's own standard it must be called unsatisfactory. Collisions are caused by the errors of experienced men. The only safety for the superintendent is in applying the best educational and disciplinary methods to the training of the best men. Where a good record for safety is made by conductors and enginemen who are habitually careful in spite of the superintendent's neglect of inspection and education, the credit of the record is due not so much to the superintendent as to some other man—probably a former superintendent—who selected these men of good natural ability. The wise superintendent does not depend for the safety of his trains and the integrity of his own reputation on such an uncertain foundation. Knowing the possibility of labor troubles, of violent fluctuations in volume of traffic, or of the necessity for scrimping payrolls, he aims to establish a system of rules and discipline which will get the best results possible out of men *not* overendowed with natural ability and not perfectly acquainted with the circumstances of his division.

In the foregoing we have aimed, not to preach a sermon, but to state the aspect of the facts. We well understand the difficulties of carrying out the ideal discipline. Where the service on a division is 95 per cent. perfect for months at a time, the expenditure of considerable sums of money, involving much care and the establishment of plans which require years for their accomplishment, for the purpose of making the figure 99 per cent. may well involve problems which nothing but experiment will answer. On many roads the circular now before us would raise important questions at once. For example, one suggestion is that the superintendent should personally attend to examining new men. This may necessitate an additional trainmaster at $2,000 a year, to relieve the superintendent. The *results* of this $2,000 expenditure may be absolutely invisible for years. Good discipline necessitates the repression of the manager who always demands tangible evidence of profit before he will approve any new expenditure. Every now and then a new general manager consolidates divisions, doubling the work of the superintendents; in such cases the best theories of discipline are often trampled under foot, with little compunction. The improvement of discipline involves not only new expenses but new ideas. That question box: to make it profitable, a skilful lecturer and teacher should be put in charge of it, so as to keep it alive and keep the men interested in it. The lecturer cannot do this by giving to the work only his spare evenings and Sundays. And most railroad "lecturers" ought to spend a share of their time improving themselves. The art of giving out information is more difficult than that of acquiring it. One of the most suggestive paragraphs in the report is that recommending that employees listen to lectures by "authorities" on subjects in which instruction is needed. This idea has great

possibilities. Lectures on "first aid to the injured," so generally appreciated, are only a beginning toward what might be done. The North-Western has had many good lectures given on operating topics by its own officers. In speaking of "authorities" the committee means, presumably, experts outside its own official family. The North-Western, and probably most of the large roads, have men who can preach sound doctrine; but the idea of having an "expert" is worth developing because it means first, that the lecturer shall make his lecturing his chief or only business, at least temporarily, and, second, that he shall be available on any or all railroads; at least shall not be confined to his own road. A man who studies one subject as thoroughly as Mr. Richards of the North-Western studied freight handling should be heard in a very wide field. Addresses before railroad clubs and printed articles and books are right and useful, but beyond these there is room for much more work in getting the instruction closer to the minds for which it is intended.

Now and then it comes to pass that the limelight flings its glare sidewise upon the character and quality of some of our "political" railroad state commissions. Lately there has been such an illuminating episode in Connecticut. In that state two of the three members of the railroad commission are active politicians, and one of them, O. R. Fyler, has been for years the "boss" of the dominant party. Mr. Fyler was formerly insurance commissioner of the state; was chairman of the state central committee of his party; has been active and potential in the legislative lobby; and, as a member of the state railroad commission, was one of the three who in 1901 signed an annual report which not only did not expose but masked the addition of $15,000,000 or more of watered stock to the capital of the Connecticut Railway & Lighting Company. Just before the recent state convention of his party a body of Connecticut manufacturers, representing 53 industries and $50,000,000 capital, sent a delegation to Commissioner Fyler to protest against the nomination of his candidate by the convention next day. Here is the way the commissioner expressed himself to one of them, as told in the local Associated Press despatch:

> Mr. Fyler said that the manufacturers had the impudence to tell him that they would fight against the man whom two-thirds of the Republicans at the caucuses had said they wanted. Said he: "Those men owe their success to the tariff. Do you suppose the people of Connecticut believe that Congress will punish them because Mr. Lilley is to be Governor? What is the relative size of Connecticut, as compared with the rest of the country? Do the manufacturers insist upon their threat? If they do we will insist that they pay their just share of the taxes of this state. General Keeney, you had better call off those men or we will line up on the issue whether the manufacturers of this state are our masters or the masters of the Republican party." In the course of further argument Mr. Fyler said that if the manufacturers were going to line up he would line up the workingmen of the state.

In view of such a local situation it is hardly strange that there is a party revolt in Connecticut against the railroad commissioner and his candidate for governor. But that is the affair of her citizens. Of sharper as well as more general import is the light cast by the incident on the sort of personality that too often finds lodgment in those state railroad commissions, where coolness, trained judgment, good temper and exclusion of political impulse and motive are the prime conditions of benign efficiency—and growing more so as the state commissions wax in power and the problems that they must meet and solve deepen.

EQUITABLE DISTRIBUTION OF COAL CARS.

Another judicial decision on the knotty question of distributing coal cars was handed down last week. It is by Judge Pritchard, in the United States Circuit Court of Appeals at Richmond, Va. At Baltimore, this week, hearings are being held in still another case, that in which the Federal Court is asked to enjoin the Interstate Commerce Commission from deciding, for another complainant, as regards coal cars on the Baltimore & Ohio, the same questions which have been pending before the Court in this suit. Judge Pritchard's Richmond decision was on an appeal from the Baltimore decision of Judge Morris, which was handed down a year ago (*Railway Age*, June 21, 1907, page 1174), and Judge Morris is reversed. While this appeal has been pending the same general question has come before Judges Grosscup, Baker and Kohlsaat, in the United States Circuit Court at Chicago, and their decision was reported in the *Railroad Age Gazette* July 3, last, page 448. On the main question all of the judges seem disposed to agree with the Interstate Commerce Commission, which has discussed the subject at length several times;* but the different elements of the problem seem to come up in a different light at each succeeding trial, and the whole question seems destined to go to the Supreme Court.

Judge Pritchard declares that "the cars of the carrier used for fuel for its own locomotives, its regular equipment of cars, the cars of other roads sent in for fuel and the private cars of the mine operators should be placed absolutely on the same basis;" and the case was remanded to the Maryland Circuit Court. It is that of the Pitcairn Coal Company against the Baltimore & Ohio, and the Cumberland & Pennsylvania railroads, the Fairmont Coal Company and its allies, and thirty other coal companies. The complainants had alleged they were discriminated against in the distribution of coal cars. Judge Pritchard held that the interstate commerce law "casts upon the carrier the plain duty of furnishing a fair and equitable distribution of car facilities, and this duty cannot be evaded by the carrier claiming that it is not the owner of a portion of the cars carried over its lines." The court held that there was discrimination in favor of the Fairmont companies, and that the contention of these companies that their large contracts entitled them to such undue preference is untenable.

The Chicago decision appears to agree with Judge Pritchard's except that cars for the carrier's own coal are excepted from the rule, because the transportation of that coal is not "commerce" at all, either interstate or intrastate;—which would seem to be a very narrow and technical disposition of the question. This decision was on a suit asking to have the Interstate Commerce Commission enjoined from prescribing rules for distribution of cars on the Illinois Central and the Alton. The Commission had made an order substantially like that which it had made in the Hocking Valley and other cases, and the principles of which are now in the main endorsed by Judge Pritchard. The main points of the Baltimore decision which are now *reversed* are (1) the B. & O. need not count its own fuel cars in distributing to the mines; (2) it need not count cars sent in by other roads for supplies of coal for their locomotives; (3) the Maryland Steel Company's 500 cars used for a specially important regular service may also be excluded.

The rule adopted by Judge Pritchard is the simplest that can be found, and there are so many difficulties in the application of any other rule that it may well be that the simplicity of this one was what decided the Commissioners and judges in its favor. An important element in the question is the equitable adjustment of the car supply to the relative ability of the several mines to promptly load the coal; and from this point of view questions as to who the coal is for or where it is going have little weight. Prompt loading is, of course, a vital element in efficient service by the railroad company; and prompt distribution of empty cars to mines is greatly facilitated by pooling all cars.

Approaching the question from the standpoint of the public interest one of the first elements of the situation is that a modern common carrier ought to furnish a sufficient number

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*Railroad Commission Ohio vs. Hocking Valley, 12. I. C. C., 398; Royal Coal & Coke Co. vs. Southern Railway, Case No. 1305, decided April 13, 1908. Special report to Congress January, 1907. (*Railroad Gazette*, Vol. XLII., page 137.)

of cars for all of the traffic likely to be offered to it. Where a coal mine furnishes cars of its own, the fact implies that the railroad company is negligent. The Interstate Commerce Commission in its special report (*Railroad Gazette*, Feb. 1, 1907) went so far as to recommend that railroads be forbidden to use private cars. Aside from considerations of abstract justice, which, when admitted and agreed upon, are likely to be impossible of enforcement, those exceptions which were consented to in the Baltimore decision are sources of constant inconvenience. A simple, easily worked rule, is demanded by considerations of convenience; and in a traffic like coal, where cost must be reduced to the lowest possible point, convenience, which means economy, is entitled to full consideration.

The simple rule works hardship on the mine owner who has a lot of private cars, because in time of heavy traffic, his cars being pooled with all the rest, he is no better off than the shipper who owns no cars at all. He may lose business for lack of cars while his own cars are being used by his competitor. From his own narrow standpoint this is an injustice. He has made a large investment and does not get the full benefit of it. But if his experiment—notwithstanding the firm foothold that this practice has obtained, it must still be classed as an experiment—if his experiment is contrary to public policy, it will have to be abandoned eventually, even at the cost of a considerable financial burden. The best authorities seem to agree that the private car system is against public policy; that is to say, that the disadvantages connected with it are greater than the advantages. A committee of officers of the Pennsylvania Railroad reported that the abolition of the system would reduce (1) the amount of switching necessary, (2) the empty car mileage, (3) tracing and special movements asked for by shippers, and (4) expense of clerical and yard forces. This last was estimated at $275,000 yearly on the Pennsylvania lines, east and west of Pittsburgh. The committee also spoke strongly of the "constant irritation and jealousies" which would be done away with. The Interstate Commerce Commission interpreted this report, and the other testimony laid before it, as evidence that "individual cars" were a source of discrimination, inequality and unfairness in the coal traffic. In view of the apparently increasing number of controversies concerning this matter it is to be hoped that it will speedily reach the court of last resort.

PROPOSED ILLINOIS CENTRAL ELECTRIFICATION AT CHICAGO.

At a recent meeting of the directors of the Illinois Central, authority was given for a full investigation of the question of electrifying the Chicago terminal of that company, and experts have been employed to investigate and report on the project. This action has perhaps been precipitated by the public agitation against the smoke nuisance in Chicago and the pressure of the city officials. The suburban line of the Illinois Central in Chicago is elevated north of Grand Crossing, and it has for a long time been regarded as an ideal place for electrification. There is abundance of water for use in condensing engines in the lake directly alongside and a good supply of cheap coal. The line is comparatively level, and there are eight tracks into the down-town terminal, two being for suburban local service and two for suburban express service, the local tracks to the extreme west and the express on the extreme east. Between these are two tracks for through passenger service and two for freight. The local and express suburban tracks are used exclusively for urban and suburban passenger traffic. The through passenger and freight tracks are used also by tenant lines, the Big Four, the Michigan Central, the Chicago, Cincinnati & Louisville, and the Wisconsin Central.

The electrification of this terminal has doubtless been delayed by the complication and expense connected with the operation of the heavy through passenger and freight traffic which would require large electric locomotives. There is also the uncertainty as to the best type of locomotive for this service. There does not seem to be any good reason, however, why the electrification of the suburban lines could not have been taken up confidently years ago and treated as a separate matter; as we have said, the tracks are entirely separate, and are used exclusively for local passenger business. This traffic is not at all different from that on the elevated lines in New York and Chicago. The Manhattan Elevated in New York discarded steam locomotives and equipped its cars with electric motors in 1899, and the South Side Elevated in Chicago was changed in a similar manner in 1898. It is well-known that this change resulted in a substantial reduction in operating expenses and faster schedules, and both companies have shown increased profits ever since they were electrified.

The experience on the Manhattan Elevated was that while the number of passengers hauled decreased 21 per cent. between 1893 and 1899, on account of competition of the surface roads, between 1899 and 1904, as a result of electrification, it increased its number of passengers 50 per cent. while the number of passengers of the surface roads only increased 8 per cent. Immediately after the electrification of the Manhattan, the cost of operation was reduced from 13.2 to 9.5 cents per car-mile, and the operating ratio with reference to gross earnings was reduced from 58 per cent. to 41 per cent.

The majority of the suburban cars on the Illinois Central are lighter than the ordinary suburban cars on electric lines, and the trains in the former service could be operated in multiple control by electric motors on the trucks and without the use of electric locomotives.

The Illinois Central week-day suburban service consists of 121 trains southbound and 123 trains northbound in twenty-four hours. The majority of these trains run out as far as Woodlawn Park, 6.45 miles, while others go to Kensington, 13 miles, and a few to Flossmoor, 24 miles. The average length of run of local trains between stops is from one-half mile to one mile, the schedule speed ranging from twelve to twenty-four miles an hour. For the express trains the average length of run between stops is 6.2 miles, and schedule speed 33.8 miles an hour. It has been estimated by electrical engineers that the same trains in express service could be operated on a schedule of 45.4 miles an hour. This assumes a length of stop of 10 seconds and a reduction in speed by brakes at the rate of 1.5 miles per hour per second. It was found that the schedule of the local suburban trains could only be shortened by electric motors about 15 per cent. This shows the remarkable efficiency with which the steam locomotives with four small drivers are operated, and that so far as acceleration is concerned they are admirably adapted to the service. But this efficiency in acceleration by the steam locomotive is only obtained by the use of a sharp blast of the exhaust, which is the cause of the noise, smoke and cinders—due to frequent stops less than a mile apart—which are complained of by the residents along the line as well as by passengers.

Electrification would, therefore, result in a marked improvement in schedule time of the express trains in suburban service, and, while no great improvement in this respect can be shown for the local trains, the objectionable features of noise and cinders peculiar to these trains would be eliminated. The steel frame cars with side doors opposite each row of seats, which are used on the local trains, weigh 82,000 lbs., and have a maximum capacity of 190 passengers each. These cars would be operated by electricity by two 200 h.p. motors on one truck of each car, and the trucks were designed with this in view.

So far as suburban business on this line is concerned, there is no doubt that it could be operated more economically by electricity than by steam locomotives, with marked improvement in schedule time and with the quiet and cleanliness

which are so much desired. This part of the work should be taken up and put into operation as soon as possible. The electrification of the through passenger and freight trains and their operation by electric locomotives is a larger problem which will not now be here considered, but from an engineering standpoint it is easily possible, and there are no great difficulties in the way of designing a power plant which will answer for both services.

RAILROAD EMPLOYEES' AND INVESTORS' ASSOCIATION.

The Railroad Employees' and Investors' Association formed in Chicago last week, has important possibilities. Co-operation between railroad owners and railroad workers, in what they ask of or recommend to the legislatures or Congress is entirely legitimate. The association proposed to steer clear of differences about wages or conditions of work arising between employees and employers, so we shall have the spectacle of meetings in which enemies are transformed into friends. "How the railroad loaf will be divided will be settled hereafter as in the past; the purpose of this organization is to try to see that there shall be a loaf worth dividing," said one of the members. The association will have nothing to do with partisan politics. It will not advise anybody to vote for or to vote against any candidate or any party. Newspaper reports or conjecture that the organization has any purpose other than those stated are misleading.

During the past three years, the heads of the railroad labor organizations have appeared often before congress and State legislatures seeking legislation that they thought would benefit their constituents—the employers' liability, and hours of labor acts, the "full train crew acts" in various States, and others. They appeared as the representatives of large bodies of voters, and so have got what they have asked for. Most of the old-fashioned railroad lobbies at Washington and the State capitals have been banished by public sentiment or severe laws. In their place responsible officers of the railroads have argued against reductions of rates and on other subjects, but they control no votes and their arguments were futile. The panic of last fall, throwing thousands of railroad employees out of work, caused an awakening. The labor leaders began to realize that their followers were being more hurt by the attacks upon railroad credit than they were being benefited by the laws specifically designed to favor them. It was the labor leaders, not the railroad officers, who first proposed an organization for the protection of the mutual interests of owners and employees.

To show railroad employees and investors, and those whose prosperity is dependent upon their prosperity, how needful it is to their good that regulation of railroads shall be done in a just and liberal spirit, and to get them to bestir themselves to create in their various communities a fairer and more intelligent public sentiment toward the carriers, is the main work which the new association has laid out for itself. When measures are pending before congress, State legislatures and railroad commissions the adoption of which would unreasonably increase the expenses of railroads or unfairly reduce their earnings, it is proposed that officers of railroads shall then appear and speak in behalf of investors, while the officers of the labor organizations shall do the same for the interests of employees.

The association as yet includes only railroads in the west and southwest. How the roads in the more conservative east and south will look upon it remains to be seen. An alliance of the railroads and their employees may tend to array the rest of the public against both, and everything will depend upon how the association is managed. The most striking facts and the soundest reasons, when presented by representatives of the railroads, have not impressed legislatures and commissions so much as the supposed thousands of votes represented by aggressive organizations of shippers or labor unions. If the new association shall be conducted along the judicious and conservative lines now promised it will have a great opportunity to neutralize the perennial anti-railroad agitation.

While the association will not have anything directly to do with differences between employers and employees it ought to have a good influence on both. The participants cannot work together to protect the mutual rights and interests of their clients without getting a better understanding of each other's points of view; and a better understanding will reduce friction.

PROPOSED SUPPLY EXHIBIT AT CHICAGO.

The makers of appliances used by the railroads in their engineering and maintenance of way departments have rented the Coliseum in Chicago for the purpose of making a complete and extensive exhibit at the time of the annual convention of the American Railway Engineering and Maintenance of Way Association and the spring meeting of the Railway Signal Association—March 15 to 20, 1909. Since its organization, the former association has met in March of each year at the Auditorium Hotel, Chicago. While the "supplymen" have appeared in force at these meetings, they have in no way, as a body, entertained the members of the association socially. A proposal from them that they be permitted to make an exhibit was rejected at the time of the first meeting; but since then they have each year rented a room on a lower floor of the Auditorium and by crowding themselves into a compact mass, with barely aisle space enough to permit two persons to pass, have managed to show a few portable tools and some small models of track and building construction. With the individual assurance from an important percentage of those members of the American Railway Engineering and Maintenance of Way Association who expect to attend the convention, that they will give a reasonable amount of their time while in Chicago to looking over the display at the Coliseum, the Road and Track Supply Association has decided to obligate itself to provide an exhibition that will be a credit to a large number of important industries. The only thing lacking to insure complete and lasting success is the uncertainty whether or not the American Railway Engineering and Maintenance of Way Association will consent to hold its meetings at the Coliseum instead of at the Auditorium Hotel. The main floor of the Coliseum contains 45,317 sq. ft. of space. Allowing 12,800 sq. ft. for aisles, as planned, leaves 32,517 sq. ft. for exhibits. If this is not enough, the first floor of the annex, with 6,138 sq. ft. for booths, may be used. The annex contains also ample room and all conveniences for a meeting place for the railroad men. It is capable of being isolated completely from the exhibits. There could be no objection, therefore, on the score of noise and confusion. As we understand it, the objection likely to be made by the officers of the American Railway Engineering and Maintenance of Way Association is that an exhibition of the size proposed would keep the members away from the meetings. But the exhibition will be made, in any event, being encouraged by the attitude of all the railroad men as individuals, if not as a body. Would it not be better to hold the meetings as near as possible to the exhibition hall, so that members of the railroad association may divide their time properly and easily between the two, rather than a mile or more away, as would be the case if the meetings were in the Auditorium and the exhibits at the Coliseum?

The annual conventions of the Master Car Builders' and American Railway Master Mechanics' associations and the American Street and Interurban Railway Association afford excellent testimonials to the wholesome effect of exhibits of railroad appliances on the meetings themselves. During the past few years these annual displays have grown in size, character and ingenuity until they have become miniature world's fairs. They are not only a credit and a help to the railroad

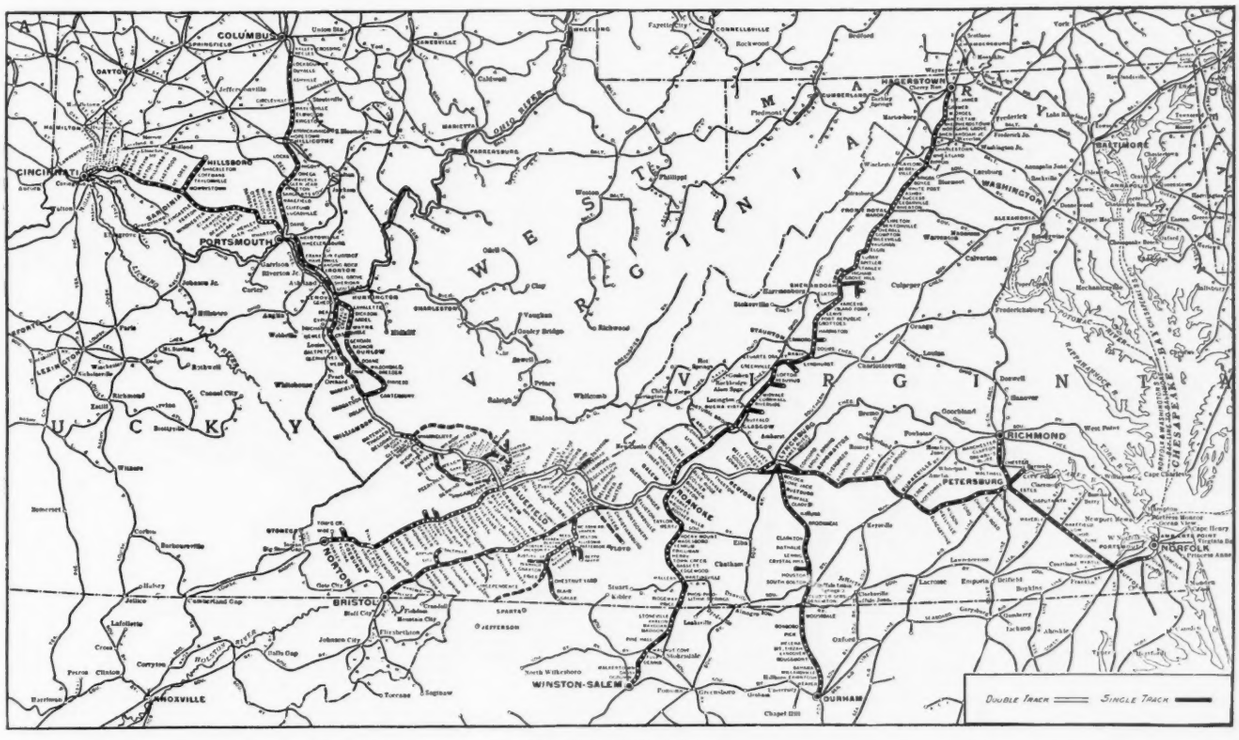
associations which permit and encourage them, but they attract a large number of executive, operating and purchasing officers who have no direct interest in what goes on within the four walls of the meeting hall, but derive much profit from examining the exhibits. The published proceedings of the associations speak for themselves on the subject of attendance and interest in the discussions. It is to be hoped that the present officers of the American Railway Engineering and Maintenance of Way Association will accept the opportunity that now affords.

NORFOLK & WESTERN.

It has been the misfortune of the Norfolk & Western to suffer during the fiscal year ended June 30, 1908, both from too much business and from too little business. During the first five months up to and including November, the gross earnings showed an increase of from 9 to 21 per cent. over the corresponding months of the previous year. Because of this large increase in gross, the road was not prepared to handle the traffic as economically as it had in the previous year, so that in September, when the increase in gross was 15 per cent., the increase in net was but 3 per cent.; and in October, when the increase in gross was 20 per cent., net increased but 5 per cent. Beginning with December, there was a sudden and large decrease in gross earnings which, in May, amounted to 30 per cent. The road was not able correspondingly to cut down expenses, and therefore net earnings decreased on an average from 20 per cent. to 34 per cent. But, in cutting down expenses, the liberal policy of previous years in providing for maintenance of way and equipment was not departed from.

The Norfolk & Western began the year with large improvements under way for which it needed to do considerable financing. Ten million dollars divisional first lien and general mortgage 4 per cent. bonds were authorized to be issued, but, owing to the state of the bond market, these bonds were held as collateral to secure an issue of two-year 5 per cent. notes to the amount of $7,500,000. The improvements were in full swing when the general business depression was sharply reflected in the falling off in gross earnings of the road, and it was decided to stop all work that was not of the greatest importance and to cut down expenses for improvements as much as possible. Notwithstanding this policy, there was spent for construction, equipment and betterments over $8,400,000, of which about $6,100,000 was charged to capital account and $2,300,000 to betterment fund. There was spent over $2,000,000 for additional main track and over $3,300,000 for rolling stock. This does not include about $1,700,000 advanced to subsidiary companies for construction.

Of this last named sum, $1,140,000 was advanced to the Lynchburg Belt Line & Connecting. This company, it will be remembered, was organized to build about 22 miles of line from Phoebe, Va., to Forest, the courts having held that this piece of line was not in a proper sense a branch of the Norfolk & Western, because it was to be built for the purpose of relieving the old line of some of its traffic. The Norfolk & Western, therefore, could not, under its charter, bring condemnation proceedings. The Lynchburg Belt Line & Connecting has given the Norfolk & Western a 5 per cent. bond for $2,748,780 in return for money advanced to it for construction, and has also given the Norfolk & Western trackage rights over its line which is now in operation. The stockholders are to be asked by the directors at the annual meeting for authority to purchase the Lynchburg line.



Norfolk & Western.

The ultimate plans for improving the Norfolk & Western and making it better able to meet the competition of the Virginian Railway, now building, include the double-tracking of the Norfolk & Western line from Phoebe, Va., to Columbus, Ohio, and the installation of 600 miles of block signal on the main line. Twelve million dollars has been estimated as the approximate sum necessary to carry through the proposed improvements, and it is interesting to notice that the company has a balance of $12,000,000 divisional first lien and general mortgage 4s, beside the $10,000,000 pledged as collateral for the two-year notes of its divisional first lien and general mortgage 4 per cent. bonds unissued.

The gross earnings of the Norfolk & Western for the year

ended June 30, 1908, were $28,962,217, a decrease of a little over 7 per cent.; net earnings were $10,402,730 for 1908, a decrease of 11 per cent. Thus operating expenses were $18,559,487 in 1908, a decrease of 4.9 per cent. It must be borne in mind in making these comparisons that during the last year the accounts were kept in accordance with the new rules laid down by the Interstate Commerce Commission, so that an accurate comparison with the previous year is impossible. Passenger earnings decreased 4.5 per cent., being $4,000,000 in 1908, and at the same time the number of passengers carried increased 13.5 per cent., being 4,800,000 in 1908. Freight earnings were $24,000,000 last year, as compared with $26,000,000 in the previous year, a decrease of 7.7 per cent.

There was spent per mile of line operated for maintenance of way in 1908 $1,838, as compared with $2,077 in the preceding year. The unit costs of maintenance of equipment for the last two years compare as follows: Average cost of repairs to locomotives, $1,491 in 1908 as against $1,921 in 1907; passenger cars, $615 in 1908 as against $690 in 1907; freight cars, $56 in 1908 as against $55 in 1907. Considering that there have been added during the year 540 locomotives, 155 passenger cars and 21,103 freight cars, which presumably did not require as much spent for repairs during the first year in service as the average equipment, the sum spent on maintenance of equipment seems ample.

The balance sheet shows that the company had over $6,000,000 cash on June 30, with accounts payable of but $1,900,000. This is an ample working capital if business conditions are such that the company can increase its funded debt so as to provide for construction work going on and planned. While interest payment on the new $7,500,000 notes is an added obligation, the semi-annual dividend on the $66,000,000 outstanding common stock was reduced during the year from 2½ per cent. to 2 per cent. That means that while fixed charges have increased by $375,000, dividend payments have been decreased by $660,000.

Traffic figures show some marked changes from the previous year. The tonnage of most classes of freight decreased, the tonnage of bituminous coal, however, being an exception, 9,700,000 tons having been carried in 1908 as against 9,400,000 tons in 1907. The tonnage of nearly all classes of manufactures decreased very noticeably, the tonnage of household goods and furniture decreasing nearly 70 per cent., and the tonnage of pig and bloom iron shipments were but 316,000 tons in 1908, a decrease of about 46 per cent. from the previous year. Lumber shipments show a decrease of 22 per cent., being 1,540,000 tons in 1908. The average trainload last year was 571 tons, an increase of two tons over the previous year.

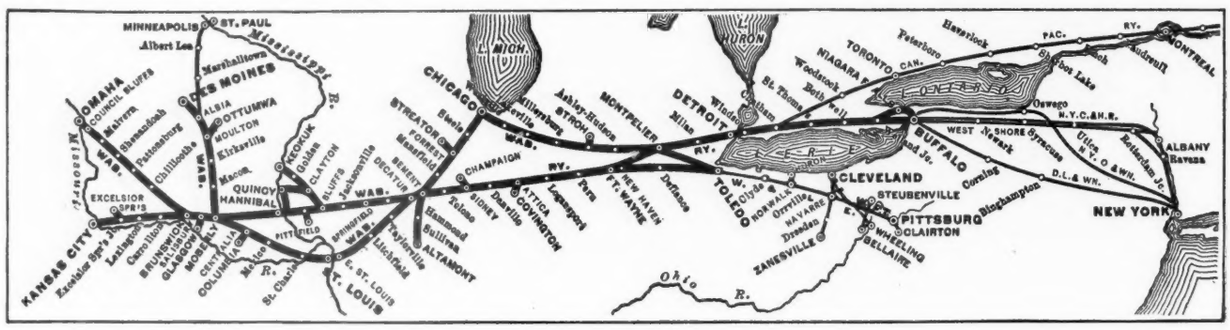
The difficulty which the Norfolk & Western has had in holding down its operating expenses when a large amount of traffic was offered and its inability to cut down expenses proportionately when business decreases, apparently points the statement that the company's best future depends on its ability to carry through the proposed improvements properly, and so to handle its traffic more efficiently.

The following table summarizes the results:

	1908.	1907.
Mileage operated	1,881	1,876
Passenger earnings	3,077,482	4,163,119
Freight earnings	23,990,630	26,000,946
Gross earnings	28,962,217	31,164,381
Maint. way and structures.	3,458,089	3,895,548
Maint. of equipment	4,683,080	5,239,899
Traffic expenses	475,606	537,674
Conducting transportation..	9,346,049	9,256,228
Operating expenses	18,559,487	19,514,536
Net earnings	10,402,730	11,649,846
Net income	5,773,909	7,000,319
Betterments to property	1,360,000	1,246,652
Surplus for the year	367	671,552

WABASH.

The Wabash began the last fiscal year with the handicap of being in need of considerable financing. It could have issued first refunding and extension 4 per cent. bonds to meet its needs if bond market conditions had been in the least favorable, but they were not. It will be remembered that in the previous year, stockholders had voted to authorize $200,000,000 first refunding and extension 4 per cent. bonds, but at that time the trouble had been to get the holders of the debenture bonds, series A and B, to consent to any sort of exchange. On June 30, 1908, there were outstanding only some $543,000 series A., debenture bonds, and $2,137,000 series B. Although the mortgage securing the debentures does not cover quite all that the mortgage securing the refunding bonds does, the debenture bond holders claim that no other mortgage can be put on the property covered by its mortgage until interest at the full rate of 6 per cent. is paid on both series. Series B is not redeemable at the will of the company. The debenture bonds now outstanding are less than 10 per cent. of the total issued and satisfactory arrangements could be made with the holders of these bonds if the Wabash were able to sell its refunding mortgage bonds, but at present these bonds are selling around 60, making such financing out of the question.



Wabash.

Besides its being handicapped by the need of funds, the Wabash operated all its United States mileage under 2-cent fare laws. Under this law, loss in passenger earnings has been about 7 per cent., earnings being $6,500,000 in 1908. On the other hand, about 10 per cent. more passengers have been carried. In the absence of figures showing the expenses divided between freight and passengers, it is impossible to estimate how seriously the 2-cent fare law is affecting the company's net earnings. It would be interesting to know how much of the $1,000,000 saved in the expenses of conducting transportation in the past year have been saved in the freight department and how much in the passenger department. The danger of any arguments drawn from the earnings of roads operating under the 2-cent fare law for or against this law as long as it is impossible to truly allocate the expenses between freight and passenger is obvious.

One more burden that the Wabash has had to bear in the past year is that, while in the past it has had difficulty in getting its cars returned from other roads in a time of

car shortages and the balance of hire of equipment has been in its favor, last year, with large car surpluses, it has been forced to leave its own cars idle, while it paid hire on cars of foreign companies. The reason given for this, is that the Wabash forms a connecting link and takes its traffic, loaded on foreign cars, to deliver to foreign companies.

With these hardships, some of which are borne by its neighbors and competitors and some not, the company operating two less miles of track in 1908 than in the previous year had gross earnings of $25,700,000 as against $27,400,000 in 1907 and net earnings of $6,000,000 as compared with $7,000,000 in the previous year, a decrease of 6 per cent. and 19 per cent. respectively.

The previous policy of charging large sums for improvements and betterments to income account was much modified, so that while there were over $3,000,000 improvements and betterments in 1907, there was but $900,000 charged to betterments from income last year. On the other hand, the maintenance charges were higher than they were in 1907. Maintenance of way and structures excluding additions and improvements, cost $1,085 per mile of line in 1908, as against $927 in the previous year. The unit costs of repairs of equipment are as follows: $2,785 per locomotive in 1908 as compared with $2,460 in the previous year; $726 per passenger car in 1908 as compared with $612 in the previous year and $58 per freight car last year as compared with $57 the year before. As these figures are exclusive of renewals, this is liberal expenditure.

The per cent. of freight earnings to total earnings was 66.45 in 1908 and 67.31 in 1907. The portion of passenger earnings remained about the same. Train and mileage statistics show that there was little change in the efficiency with which traffic was moved. The average train load was 387 tons in 1908 and 381 tons in 1907. The average number of empty cars moved per day increased by 598, being 3,143 in 1908. In company with other roads so far reviewed by the *Railroad Age Gazette*, the Wabash shows a greater falling off in the products of forests than in the products of agriculture. The percentage of products of agriculture to total tonnage in 1908 being 19.57 as against 18.20 in 1907, while the percentage of products of forests was 6.63 in 1908 as against 7.21 per cent. in the previous year.

The annual report of the Wabash is a model in the completeness with which it works out its maintenance of way figures, maintenance of equipment and its train and mileage figures. The account of its financial operations is less circumstantial. The decrease of over $300,000 in miscellaneous assets and the increase of over $1,500,000 in miscellaneous liabilities is not explained unless we conclude that the increase of $1,500,000 in the cost of road and equipment is accounted for by the fact that the Wabash had the right to issue refunding and extension bonds for this sum, but had to borrow money in some other way pending an improvement in its credit. The large increase of investment in stocks and bonds is unexplained in the report, because no schedule of these securities is given. Nor are the charges in the income account carried through in the ordinary manner, although the ultimate profit and loss result is not affected thereby.

The following table summarizes the results:

	1908.	1907.
Mileage operated	2,515	2,517
Freight earnings	$17,103,693	$18,465,286
Passenger earnings	6,470,678	6,891,289
Gross earnings	25,740,074	27,432,479
Maint. way and structures.	2,728,235	2,747,667
Maint. of equipment	4,359,313	3,915,261
*Traffic	860,069	.....
Conducting transportation..	10,240,198	12,153,324
Operating expenses	18,843,748	19,505,147
Taxes	727,470	883,551
Gross income	5,566,297	7,064,771
Fixed charges	4,085,211	4,038,496
Net income	1,481,086	3,026,275
Interest on debentures	370,000	475,000
Betterments	894,219	2,089,611
Surplus.	216,867	461,664

*Included in conducting transportation in 1907.

NEW PUBLICATIONS.

Biographical Directory of Officials of the Atchison, Topeka & Santa Fe. By Albert MacRae, Managing Editor of the *Santa Fe Employees' Magazine, Chicago.*

This is a sumptuous volume of 116 pages, 9½ in. x 12½ in., devoted wholly to portraits of officers of the railroad named, with biographical sketches; all very brief, like those which usually appear in the *Railroad Age Gazette.* Five of the officers, President Ripley, Vice-Presidents Kendrick, Nicholson and Jansen and Chairman Morawetz, are shown in full-page cuts; but the others are arranged four on a page, all in strictly alphabetical order.

Manual for Engineers. Tables and other data for engineers and business men. Compiled by Chas. E. Ferris, B.S., Professor of Mechanical Engineering, University of Tennessee. Published by the University of Tennessee, Knoxville, Tenn. 3 in x 5½ in.; leather. 50 cents.

This is the eleventh edition of this pocket companion, 50,000 copies of which have been published. The present edition contains new and valuable matter, including a carefully arranged four-place logarithm table. For many uses such a table is as satisfactory as the more cumbersome tables of six or more places. The book, which has 151 pages exclusive of advertisements, is vest pocket size, and will be found useful and convenient.

Moody Manual of Railroad and Corporation Securities, 1908. 2852 pages. Moody Manual Co., publishers, 33 Broadway, New York. Price, $10.

The 1908 edition of Moody's Manual contains the earnings of many corporations for the fiscal year ended June 30, 1908. The manual is somewhat later in coming out this year than in previous years, but the fact that it includes 1908 figures of a number of railroads more than offsets the disadvantage of its late appearance. The work is too well-known to need any description, it being a necessary part of any financial library. The descriptions of statements of corporations have been amplified and new companies have been added, making this section about 30 per cent. larger than it was last year. There is a new section called "Public Utilities," in which are placed all companies which hitherto were covered by the several sections treating this class of corporation. The section devoted to mining corporations has been enlarged and special attention has been given to procuring accurate figures in this difficult field.

The Brazilian Year Book for 1908. Issued under the patronage of the Brazilian Government, and compiled and edited by J. P. Wileman, Editor of the *Brazilian Review* and the Director of the *Commercial Statistical Service* of Brazil. Published in Rio de Janeiro at the offices of the *Brazilian Year Book*, 42 Rua Visconde da Inhauma; may also be obtained from Messrs. McCorquodale & Co., Ltd., 40 Coleman street, London, England, and from G. R. Fairbanks, Room 22, 68 Broad street, New York City. 780 pages; 6 x 9⅝ in. Price, $11; postage free

The appearance of every first-class statistical work in a new field is an event of considerable importance, because it opens up vistas of knowledge which have hitherto been obscured, and places accurate information at hand where a long and oftentimes fruitless search has previously been necessary. The *Brazilian Year Book* is a work of this kind. It contains a mass of information about commercial Brazil and, to a certain extent, combines the functions of a *Poor's Manual* with those of the publications of the United States Department of Commerce and Labor, while the chapters devoted to Brazilian weights and measures, geography, trade mark regulations, climate, constitution, population, etc., suggests the *Statesman's Year Book* or *Whitaker's Almanac.* The course of exchange, corresponding to average annual sight rates, is given from 1835 to 1907; imports and exports variously classified fill the next 315 pages of the book, and are followed by tables of Brazilian revenue and expenditure, including both the federal government and the states. These tables fill an additional 52 pages and cover a series of years. Then the revenues and expenditures of the leading municipalities are taken up, followed by the debts of the federal government

and of various states, extending over a period of 45 years in the case of the federal government, and for shorter periods for the states. Following these statements of debt, revenues and expenditures comes a portion of the book which will be very much appreciated in this country, and that is a careful description of each of the Brazilian states, embracing geography, position, inhabitants, government, municipal organization, etc. Each of the great Brazilian railroads is similarly taken up, illustrated with a good map, and described in detail, with statistics going back in some cases for a generation or more. The principal industrials (joint stock companies) are also described in somewhat less detail, and certain commodities of special interest, such as rubber, have their own pages of carefully worked out statistics.

It may be said with considerable assurance that nobody with a strong educational or commercial interest in Brazil can afford to be without the *Brazilian Year Book*, and it is to be hoped that the work thus begun will be carried on regularly as an annual publication.

Letters to the Editor.

THE LARGEST THREE-HINGED ARCH.

New York, September 18, 1908.

To the Editor of the Railroad Age Gazette:

In your issue of July 31, we note that Professor Jacoby gives for the longest three-hinged arch in America the Mississippi river bridge, having a span of 456 ft. Permit us to call your attention to the three-hinged highway arch at Bellows Falls, Vt., with a span of 540 ft., which was built by our company in 1904, and has been described in the *Engineering Record* and in the writer's paper, which was read before the American Society of Civil Engineers last April. We may say that we are proud of this bridge, and have therefore taken the liberty of calling your attention to it.

LEWIS D. RIGHTS,
Contracting Manager, Lewis F. Shoemaker & Co.

THE LARGEST BRIDGES.

Ithaca, N. Y., September 22, 1908.

To the Editor of the Railroad Age Gazette:

Referring again to the article on "The Largest Bridges in the World," published in your issue of July 31, two additional corrections have to be reported. The widest bridge is 790 ft. wide, accommodates 33 tracks crossing H street, at the Union Terminal Station, in Washington, D. C., and was opened to traffic in 1907. The longest three-hinged arch span has a length of 540 ft. between centers of end hinges, crosses the Connecticut river above Bellows Falls at Rockingham, Vt., and North Walpole, N. H., and was completed in 1905. Two other corrections were published in your issue of Aug. 14.

I desire to express my appreciation of the kindness of various engineers, who by calling attention to errors or furnishing new data, have helped to secure correct information on this interesting topic.

HENRY S. JACOBY.

ACCOUNTING OFFICERS AND THEIR SUPERIORS.

Chicago, September 11, 1908.

To the Editor of the Railroad Age Gazette:

In your issue dated August 21, 1908, an open letter dated August 8, 1908, under the head of "Need of Railroad Co-operation," signed "F. F. L.," contains the following paragraph:

"The railroad accounting officers, dealing with an important branch of railroad management which just now is being minutely watched by the Government, have done as they pleased for several years past, and seem now to have committed the railroads of the country to methods of accounting which are inimical to the interests of the railroads generally, and all because the accounting officers have not been required to keep themselves closely in touch with their executive superiors, and probably, have been unduly influenced by unofficial and perhaps ill-advised communications from a government official."

This indicates an impression in the mind of the writer thereof, that the accounting officers of the railroads of the United States have gotten beyond the control of their executive officers, who are their superiors; that the accounting officers have recommended and advocated policies of railroad management in opposition to the expressed wishes of their superior officers.

I scarcely think that can be true, but I believe that every railroad president still controls his accounting officer and that the accounting officers have respect for and carry out the wishes and instructions of their presidents.

This sort of innuendo has been thrown out on several occasions during the past year, and I am sure that every accounting officer will be very glad if Mr. "F. F. L." will state in your columns definitely the branch of railroad management to which he refers, and the methods of accounting which are inimical to the interests of the railroads generally, to which the railroads are committed by action of the accounting officers, in opposition to their superiors to whom they report.

F. NAY,
General Auditor, Chicago, Rock Island & Pacific.

FREIGHT RATES AND RETAIL PRICES.

Calgary, Alta., September 16, 1908.

To the Editor of the Railroad Age Gazette:

Just a word in appreciation of G. C. White's statement in your issue of Aug. 28 that "high prices have been due to other causes, but the jobbers and the retailers have continually thrown dust in the eyes of the people and the railroads have had to bear the odium of the high cost of living."

A gentleman recently from the East, coming in from Edmonton, the capital of the province of Alberta, the other day told me of an experience he had there in a barber shop. He was asked 25 cents for a shave, and on his protesting that he never paid more than 15 cents, was told that "the freight is very high out here." This, of course, is only a story, but it is a fact that in almost every case where a person raises a protest against exorbitant prices the railroads are blamed by the dealer. Calgary is a city of almost 25,000, in the heart of the wheat growing country. There are mills here which grind the flour on the spot, yet bread is as dear as, if not dearer than, in Montreal, 2,200 miles farther east. British Columbia salmon that is 15 cents a can in Montreal is 20 cents here. It is impossible to get a fair California orange for less than 40 cents a dozen, while good ones are 50 and 60 cents. These are but a few samples; and if the inconsistency of blaming the railroads is pointed out to the dealer he merely shrugs his shoulders. He can make a profit of 20 or 25 per cent. and it is all right. It is the Canadian Pacific, that pays a 6 per cent. dividend, that is the oppressor of the people.

A. C. LOUDON.

INSTRUCTION OF EMPLOYEES ON ALTON AND THE CLOVER LEAF.

Chicago & Alton Railroad Co.,
Chicago, September 17, 1908.

To the Editor of the Railroad Age Gazette:

Referring to the editorial criticism appearing in your issue of August 21, page 744, in connection with an article published in the *Railroad Age Gazette* of July 31, page 616, relative to the semi-monthly instruction meetings held on the Toledo, St. Louis & Western and Chicago & Alton Railroads, it is difficult to understand how that article could be interpreted to convey the impression that the meetings—which embrace consideration of the many topics essential to railroad business—abolish or in any way conflict with regular examination of employees on operating rules.

We are criticised on account of discontinuing the services

of a special examiner, which point was not referred to in the communication on which was based the article in your issue of July 21; and in order to correct any erroneous impressions brought about by your editorial, I will say that employees on these lines are examined by the employing officers as to their intelligence and ability to perform the duties to which they aspire, before being enrolled in the service. Applicants for promotion are required to pass a satisfactory examination on the American Railway Association operating rules; such examinations being conducted by a committee composed of Trainmaster, Road Foreman of Engines and Chief Despatcher or his assistant.

Any practical railroad man will agree that railroading is a school in which one's education is never completed, that the efficiency of employees does not entirely depend upon familiarity with the code of operating rules, and that close and harmonious understanding and action between officers and the rank and file of employees is productive of the best results for railroads or other concerns.

As previously stated, we at present know of no better method of establishing such unison than our system of meetings, wherein all are invited to attend and are free to ask for explanations or instructions on all subjects (interpretations of operating rules included) from the officers present, whose ability should enable them to give clear illustrations and explanations.

While you are at liberty to publish this letter, we do not care to continue a discussion through your columns in connection with a system we have found to be satisfactory and beneficial to all concerned.

P. H. HOULAHAN,
General Manager.

UNIT COSTS OF RAILROAD BUILDING.

The Cheboygan extension of the Detroit & Mackinac was opened in 1904. It runs from Tower, Mich., northwest to Cheboygan, 23.46 miles. Cheboygan has a number of factories, for the business of which the D. & M. now competes with the Michigan Central, and is also the starting point for a number of ferries and steamship lines. The extension runs through some good farming country and taps a valuable belt of hard wood timber. The passenger traffic to summer resorts is also important.

The first four miles of road from Tower is across an open plain. The next 12 or 14 miles, to the northern end of Mullet lake, is through slightly hilly, well-wooded country, with short stretches of burnt ground and swamp. The rest of the route is in rolling country, most of which is cleared land.

The road is single-track, laid with 70-lb. rail, maximum curvature 1 degree and maximum grade 0.5 per cent. Good gravel ballast was found about one mile from grade. There was no rock work and the bridge and culvert work was light. The largest bridge is a steel structure, 130-ft. span, with concrete abutments, over the Cheboygan river. The rest of the work is concrete.

The cost of the 23.46 miles was $323,526, including engineering, grading, clearing, grubbing, ties, rails, ballast, bridges,

Roadbed Across Plain.

trestles, culverts, track fastenings, frogs, switches, track laying and surfacing, fencing portions of right-of-way, crossings, cattle guards, signs and other expenses. This is $13,790 per mile. The cost of station buildings, roundhouse, telegraph lines, interlockers and signal operators was $18,724, or $800 per mile.

Line Through Wooded Country; Detroit & Mackinac.

THE FIRST INTERLOCKING PLANT IN AMERICA.

BY J. A. ANDERSON.*

The general use, upon the leading railroads of America, of the interlocking system of switches and signals, lends interest to the question as to when this system was first introduced in this country.

It has been understood that the first installation of this character in America was at East Newark, New Jersey, on the line between Philadelphia and Jersey City, operated by the Pennsylvania Railroad Company, under lease from the United New Jersey Canal & Railroad Companies.

The East Newark machine was No. 2164 of Saxby & Farmer, London, England. The material was shipped by that firm in October, 1874, and was put in in December of that year and the two following months. It was put in service February 11, 1875. On this machine the familiar "flop" locking was used.

Some recent inquiries, initiated by Mr. George D. Fowle, now Consulting Signal Engineer of the Pennsylvania Railroad, have revived the recollection of an earlier installation, on the same lines, prior to the lease.

Ashbel Welch, General President and Chief Engineer of the United Companies, during a visit to England in 1869, made a careful study of the interlocking system in use in that country, and, upon his return, made to the Executive Committee of the Joint Board a report upon his observations, and he was authorized to make trial of the system at Trenton Station, New Jersey. The following is a copy of the Report and Resolution, preserved by Mr. Welch's son and namesake, General Manager of The Belt Line Railroad of Philadelphia, and by him supplied, with other important data, to the writer.

The paper is endorsed, "Station and Switch tending, Dec. 27, 1869. Read before the Ex. Committee, Dec. 27," and is as follows:

"Most American constructions and arrangements are better, at least for America, than the European. But this is not always the case.

"One of the arrangements which is much better in Europe than with us is the working of switches and signals. They have one man in a small glazed room or observatory, who works all the switches and signals anywhere near, in one of the directions from the station. No train can approach the station without signal from him that the track is clear.

"A signal and switch man should be under cover, protected from heat, sun, rain, snow and cold, and danger, so that his whole time and attention may be given to his work instead of self protection, and so that discomfort or fear shall not make him nervous, out of temper or negligent.

"One man should work all the switches from one direction, because:

1st. His signals and points will not clash, as those of different men may, from want of understanding with each other.

2d. One man does the work of several, and so saves great expense.

3d. A good man put at a single switch has so little to do and think, that he becomes stupid; the tender of many becomes bright.

4th. A better class of men has our safety in charge.

"Experience is in favor of the European plan. At points where hundreds of trains per day pass mistakes have not occurred in many years. At Paddington station, one of the largest in the world, it is said only one run-off or mistake has occurred in 19 years. At Crewe one man works 72 levers of which probably one-third move different switches; two-third signals.

"I recommend that the European system be tried at Trenton."

This concise statement of the reasons in the case is of interest as one of the earliest, if not the first, recognitions here, in those early days of railroading, of considerations now deemed axiomatic.

Upon the presentation of this report and recommendation, action was at once taken, as appears from the following extract from the minutes of the Executive Committee, "No. 66, Dec. 27, 1869."

"The General President made a report on the signal and switch system now in use in England, and it was

"Resolved that the General President be authorized to make trial of the system at Trenton Station."

Under this authorization steps were promptly taken to carry out the design. From correspondence preserved it appears that early in January, 1870, Mr. Welch entered into communication with Mr. Herbert Ramsey, who had been connected with the London & North Western Railway and was familiar with the subject. Mr. Ramsey was authorized to give to Saxby & Farmer, of London, an order for the machine, and was engaged to come to this country and supervise its installation. He accordingly arrived early in October and was met at Trenton on October 7, by Mr. Thomas B. Fidler, one of Mr. Welch's Assistants, as mentioned in the diary of the latter, who also mentions the arrival of the material at Trenton later in the same month and, notes, on December 7, 1870, "Went to Trenton with Mr. Welch to see the workings of the points and locking apparatus just completed," thus definitely fixing the time of completion.

Fig. 1—Brass Name Plate and Manipulation Chart; Saxby & Farmer Interlocking Machine of 1870.

Obscurity has been thrown around the general fact of this installation from some uncertainty as to the exact location, of which there has been found no official record. The plan supplied by Saxby & Farmer does not conform in names and arrangement with the place at which some old employees remember to have seen the plant, which is a point known locally as the "Top of the Hill," at the junction of the Bordentown Branch with the siding on the canal bank, formerly the main track, at Hamilton avenue, Trenton, just south of the Clinton street station. The Saxby & Farmer plan shows that the machine was built for a junction having a turnout to the left while that above described presents a junction having the same layout, but with a turnout diverging to the right, as shown on the accompanying plan.

With a slight change in one of the names, evidently erroneous, in the Saxby & Farmer plan, this plan conforms to a junction at one time proposed near the Delaware bridge, in South Trenton, to connect the Belvidere Delaware Railroad by a short branch from a point north of Trenton, because of the original connection for that road requiring modification on account of changes in the tracks north of Trenton. There is no doubt that the interlocking was designed for that junction. This plan, however, was abandoned; and as a consequence of this change another place was found for the interlocking machine, namely, the "Top of the Hill."

The names on the brass name plate, a cut of which is herewith shown, confirm fully the recollection above referred to

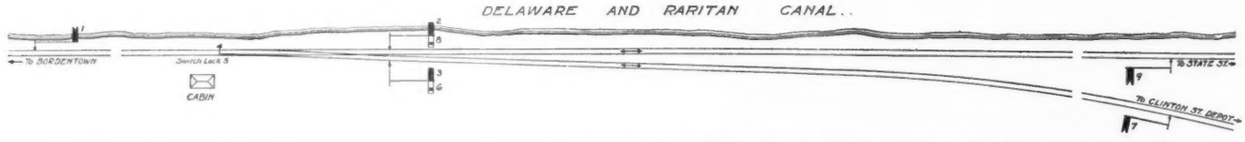


Fig. 2—First Interlocking Signals in America; United Railroads of New Jersey, Trenton, New Jersey, 1870.

*Mr. Anderson, author of *The Train Wire*, and formerly a frequent contributor to the *Railroad Gazette*, is one of the few men now living who accurately remember the facts of early railroad history in New Jersey. He entered the service of the Belvidere-Delaware, now the Belvidere division of the Pennsylvania, in 1848, and was Superintendent from 1870 to 1886.

as to the location. This plate, which also constituted a manipulation chart, mounted on the machine, facing the leverman, is still preserved in the office of Mr. R. P. Snowden, Assistant Engineer. It was probably made in this country to replace the one shipped with the machine, which, of course, had been lettered in conformity with the original plan of location. Unfortunately, this is the only part of this interesting installation which remains.

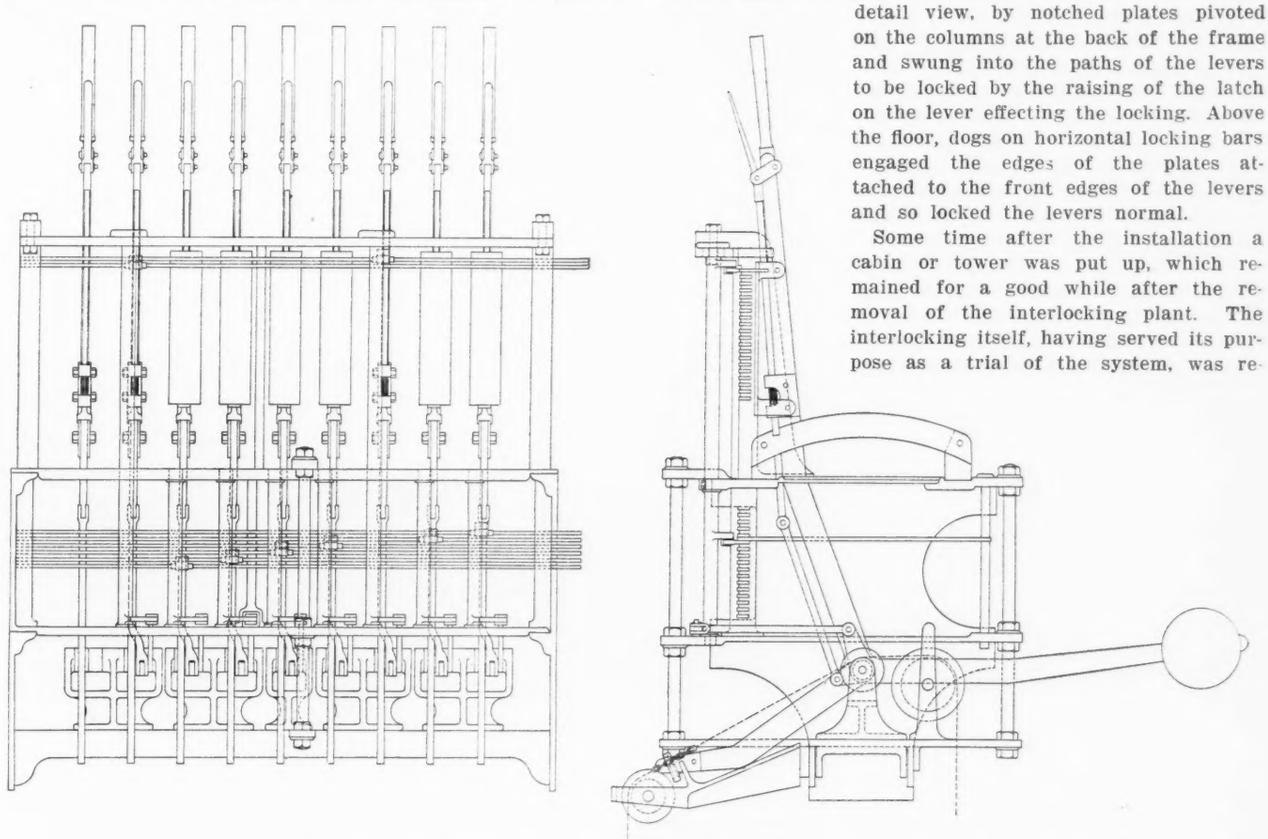


Fig. 3—Saxby & Farmer Interlocking Machine; Patented in 1867; Used at Trenton, N. J., in 1870.

The exact location of the signals cannot now be determined, but no doubt they were substantially as shown on the accompanying plan, which has simply been reversed from the plan furnished by the manufacturers, to suit the actual track arrangement. It is interesting to note that the home signals for movements in opposite directions on the same route were placed on the same post, and therefore that they did not mark the points at which trains must stop to avoid fouling the junction.

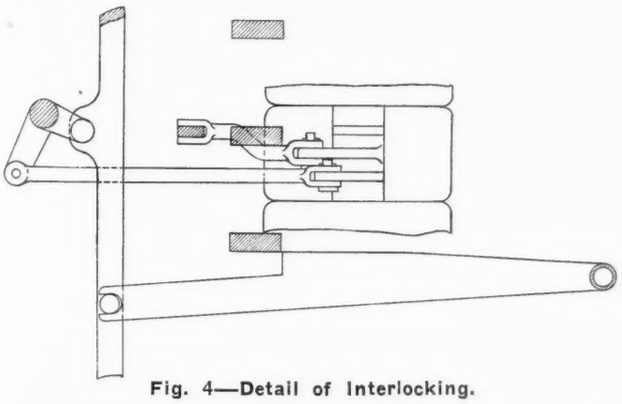


Fig. 4—Detail of Interlocking.

The machine, bearing the maker's number, 905, was of the spring catch type, with signal locking above the floor, patented in 1867. The locking seems to have represented an intermediate step between the early lever locking and the complete latch locking now in general use in this country. The raising of a latch on a given lever did not lock the latches of conflicting levers, but locked the conflicting levers themselves. Below the floor the locking was effected, as shown in the small detail view, by notched plates pivoted on the columns at the back of the frame and swung into the paths of the levers to be locked by the raising of the latch on the lever effecting the locking. Above the floor, dogs on horizontal locking bars engaged the edges of the plates attached to the front edges of the levers and so locked the levers normal.

Some time after the installation a cabin or tower was put up, which remained for a good while after the removal of the interlocking plant. The interlocking itself, having served its purpose as a trial of the system, was removed soon after the lease of the United Railroads of New Jersey to the Pennsylvania. The reason that it was removed is probably that the comparatively unimportant character of the junction did not warrant the cost of operation and maintenance.

In the preparation of the foregoing the writer has had the co-operation of Mr. C. C. Anthony, Assistant Signal Engineer of the Pennsylvania Railroad, who, besides giving other valuable assistance, prepared for publication the technical matter and drawings, from information received from Saxby & Farmer, Ltd., of London.

TESTS OF FRICTION DRAFT GEAR FOR THE ERIE RAILROAD.

In preparation for the construction of new cars the Erie Railroad invited the manufacturers of friction draft gear to send material for an open test at the works of the Westinghouse Air Brake Co., Wilmerding, Pa. This request was generally accepted and the principal manufacturers sent material, which was tested September 16, 17, 18 and 19. The tests were made under the drop with a weight of 9,000 lbs., in a manner somewhat similar to those made by R. P. C. Sanderson, Superintendent of Motive Power of the Virginian Railway, and reported in his paper before the New York Railroad Club which was discussed editorially in the *Railway Age* of April 24, 1908. The manner of calculating the foot-pounds of energy absorbed is also similar to that used by Mr. Sanderson. The Erie Railroad was represented by T. Rumney, General Mechanical Superintendent, the two Assistant Superin-

tendents of Motive Power, the Engineer of Tests, the Mechanical Engineer and two Superintendents in the car department of the road. The Rock Island was represented by C. A. Seeley, Mechanical Engineer, and the Buffalo, Rochester & Pittsburgh by W. H. Wilson, Superintendent of Motive Power. The manufacturers of friction draft gear were all represented by their principal officers. At a banquet given to these representatives by A. L. Humphrey, General Manager of the Westinghouse Air Brake Co., there was a general expression of a desire that the tests should be free and open and that there would be no objection to the publication of the results as found. These results are not all available as yet, as sufficient time has not elapsed in which to work up the data. In outline the tests consisted in first subjecting each gear to a hydraulic pressure by which it was closed and a diagram of the work done in the process obtained. Then they were placed under a drop having a hydraulically supported diaphragm, and closed by allowing a tup of 9,000 lbs. to fall upon it and obtaining the pressure on the diaphragm. Finally they were placed between two channels to which back-stops were riveted with ½-in. rivets, and blows delivered at varying heights until the rivets were sheared. We reserve further comment on these tests until all data in the case is available.

TELEGRAPH SUPERINTENDENTS INDORSE TELEPHONE TRAIN DESPATCHING.

At the quarterly meeting of the Western division of the American Association of Railway Telegraph Superintendents, held in Chicago, Sept. 17, eighteen roads were represented, as follows: Chicago, Milwaukee & St. Paul; Chicago, Burlington & Quincy; Chicago, Rock Island & Pacific; Chicago & North-Western; Atchison, Topeka & Santa Fe; Missouri Pacific; Union Pacific; Grand Trunk; Queen & Crescent; Great Northern; Wabash; Michigan Central; Pennsylvania Lines West; Chicago, Indiana & Southern; Baltimore & Ohio; Chicago & Eastern Illinois; Wisconsin Central, and Illinois Southern. The Western division includes all roads north and west of the Ohio river.

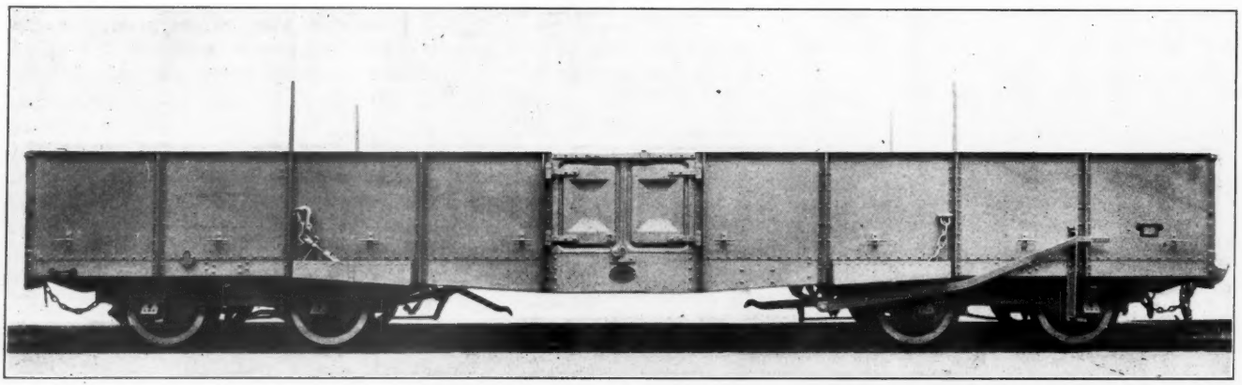
Various subjects relating to service and construction matters, telegraphic and electrical, were discussed and acted upon, the one of greatest interest being the use of the telephone for the despatching and blocking of trains. Reports to the meeting indicated that within the last two years over 6,000 miles of road have been placed under telephone operation. Nearly all of this mileage is on heavy divisions, both single and double track. The advantages as to safety and efficiency from its use were brought out and reports indicated that on divisions so managed train movements were being greatly expedited by the greater speed and flexibility of the telephone working. The train despatcher's duties are lightened, giving him more time to figure out and plan his movements, all of which tends to facilitate train movement and promote safety; operators' duties are likewise lightened.

It was the unanimous judgment of the members present, many of whom are in general charge of train despatching by telephone, that the use of the telephone for the despatching and blocking of trains has demonstrated its safety and superiority for such purposes. The following resolution was unanimously adopted:

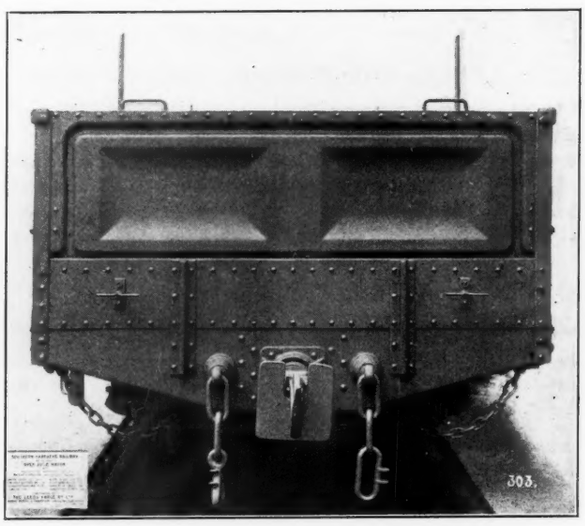
"Resolved, That in the judgment of this association the use of the telephone in the despatching and blocking of trains is just as safe, if not safer, than the telegraph, and in addition thereto has many advantages; therefore, we unanimously endorse its use and recommend its further adoption for such purposes.

NEW FREIGHT CARS FOR INDIA.

The accompanying illustrations show a new type of meter gage, 20-ton open bogie cars built for the Southern Mahratta Railway of India by the Leeds Forge Co., England. On each side are two doors, each 1 ft. 11⅛ in. wide, and at the end is a removable door opening of 10 ft. ½ in. deep. These doors constitute one of the most interesting features of the



New 20-Ton Bogie Car; Southern Mahratta Railway.



End View, Showing Removable Door.

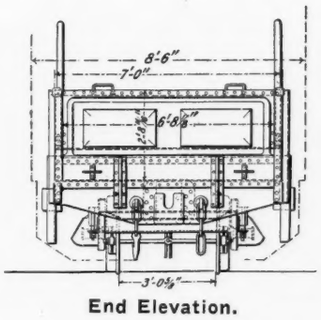
cars, as they are constructed of corrugated pressed steel on a system lately designed and patented by Francis L. Lane, General Manager of the Leeds Forge Co. The type of door, now being extensively used on new rolling stock for the Indian State, the Bengal-Nagpur, the Madras, the Ceylon Government, the Egyptian, the Federated Malay States, and various railroads in South Africa and South America, consists of a single steel plate buckled in the center, and having a continuous corrugation running all round near the edges, affording great rigidity and strength. The accompanying table shows the results of actual tests made on two doors of the same size, supported at the ends and loaded in the center, one

door being of the corrugated type and the other a built-up one of the ordinary type. It will be seen that the corrugated door, notwithstanding the fact that its weight was only 80 per cent. of that of the built-up one, deflected only a quarter as much as the latter.

	Door	
	Corrugated pressed steel.	Built-up.
Center of supports	3 ft. 10 in.	3 ft. 10 in.
Size of door	4 ft. x 2 ft.	4 ft. x 2 ft.
Thickness of plate	7/32-in.	3/16-in.
Size of frame	.....	1⅞ in. x ½ in.
Weight of door	2 qrs. 18 lbs.	3 qrs. 10 lbs.

	Deflection.	Perm. set.	Deflection.	Perm. set.
2½ cwt.	1/32-in.	....	1/8-in.	....
5 "	1/16-in.	....	¼-in.	....
10 "	1/8-in.	....	17/32-in.	1/32-in.
15 "	3/16-in.	....	7/8-in.	1/16-in.
20 "	¼-in.	....	1¾-in.	5/16-in.
25 "	3/8-in.	....	3⅝-in.	21/16-in.
30 "	7/8-in.	....	Entire collapse.	

It is said that the Lane patent pressed steel corrugated door is considerably cheaper than a built-up one, as it requires no stiffening frame, and that, as it is so much more rigid than the built-up one, further economy is effected by simplifying or reducing the number of hinges. These corrugated doors may be so designed as to be absolutely interchangeable with existing doors of other types, and they are also admirable for making the joints between adjacent doors weather-proof, by joggling the edges of one door over the other.



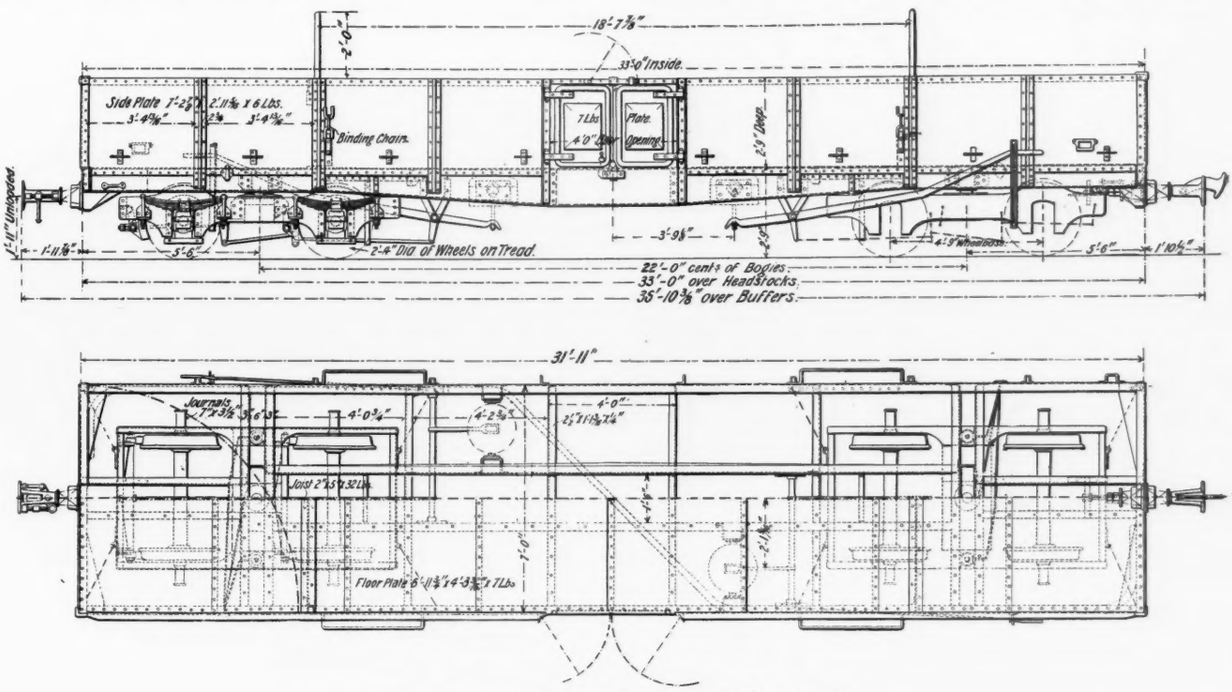
End Elevation.

The bogies and underframes are of pressed steel. The cars have the following principal dimensions:

Length over buffers	36	ft. 10⅜	in.
Length inside	33	" 0	"
Width over all	7	" 11	"
Width inside	7	" 0	"
Depth	2	" 9	"
Height over stanchions	7	" 6¾	"
Wheel diameter	2	" 4	"
Bogie wheel base	4	" 9	"
Centers of bogies	22	" 0	"
Carrying capacity	20	tons	
Tare weight	8 tons 14 cwt. 1 qr.		

ROCK ISLAND-COLORADO & SOUTHERN YARDS AND TERMINALS AT GALVESTON.

Under the name of the Galveston Terminal Railway, the Rock Island and the Colorado & Southern have since last fall been building yards and freight terminals at Galveston, Tex. These roads reach Galveston from Fort Worth over the Trinity & Brazos Valley, which they own jointly. The T. & B. V. itself runs only to Houston, but it has trackage rights from there to Galveston over the Gulf, Colorado & Santa Fe. As shown by the accompanying map of Galveston and vicinity, the entrance to the city is over the bridge of the Gulf, Colorado & Santa Fe, which is the only crossing between the main land and Galveston island and is used by all of the railroads entering Galveston. As seen on the plan of the new yard, shown herewith, at the island end of the bridge two roads branch eastwardly from the Santa Fe line—the Southern Pacific and the Rock Island. The new yards of the latter begin immediately east of the junction and extend eastward about two miles. From these yards a line runs east about a mile and a quarter to the import and export yard, beyond which are the local freight facilities. In addition to the property for right-of-way, yards, freight terminals, etc., a site for water terminals is owned from 51st to 57th streets, inclusive, just west of and adjoining the like terminals of the Southern Pacific.



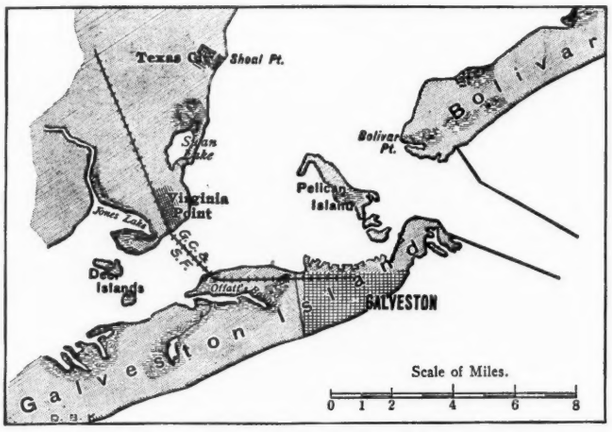
Elevation and Plans; Southern Mahratta Car.

Before building the yards, the entire property had to be filled, the grade being raised from 2 to 5 ft. The filling material was pumped from the bay, which is parallel to and only 1,000 to 1,500 ft. distant from the property. Something like 1,000,000 cu. yds. of filling material was needed.

The plan provides a double track main line from the west entrance of the yard, only one track of which will be built for the present. The long, narrow shape of the property necessitated a layout in which there is a considerable variation in track lengths in both the receiving and classification yards. All of the yard tracks will not be built at present, those left to future needs being indicated by dotted lines. Beyond—east of—the classification yard, is a cotton yard, which is a special feature of these terminals. Cotton is the leading commodity in Galveston's exports. To avoid car storage of the large quantities that must be held between

time of receipt at the yards and delivery at the wharves for export, a cotton platform 120 ft. wide and 1,200 ft.. long has been built, its capacity being 30,000 bales standing singly on end, and more than that if piled on each other on their sides. This enables the cars to be released at once and also saves the track storage room that would be required if the cotton were held in the cars. If the cotton is received in mixed lots it can be sorted here, and confusion at the wharves avoided. Sorting for the different ships may also be done on this platform. From the platform it is hauled to the docks of the Galveston Wharf Company, which are east of the Southern Pacific's docks and adjacent to the Rock Island's import and export yard. The requirement that the cotton shall be hauled in closed cars, on account of the fire risk, makes it necessary to handle it to and from the platform by hand. If open cars were used this could be done by machinery at minimum cost. With the negro labor employed, the cost of handling is about 2½ cents a bale.

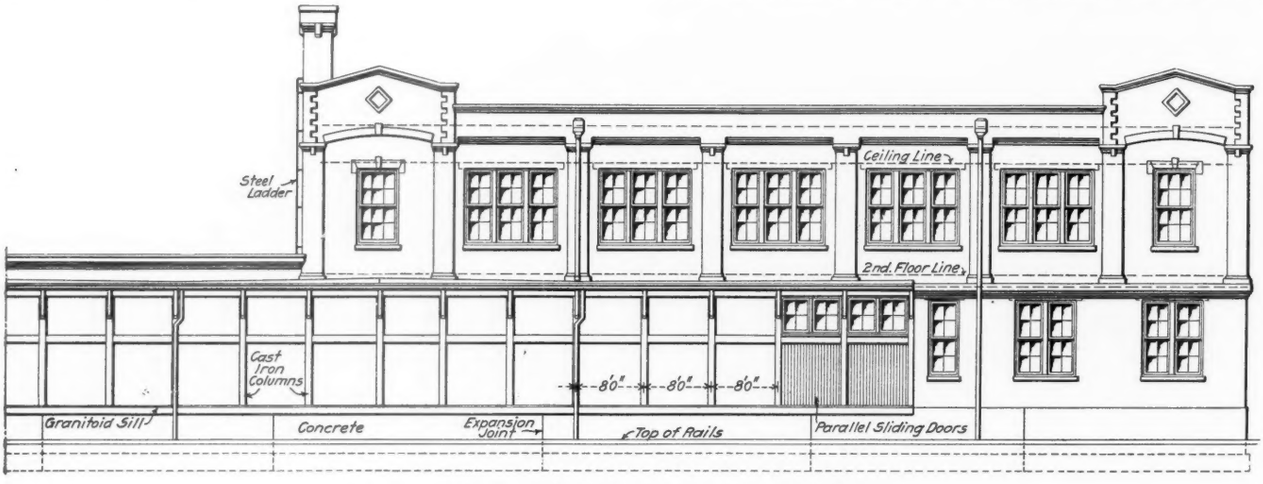
The cotton platform is built of creosoted piles and timber, filled with sand, thoroughly rammed, and paved with brick. The plan shows a future extension of this platform which will increase its capacity about 20 per cent., and a possible additional platform parallel to the first, which, with the extension of the latter, will double the present platform capacity. Building the second platform will change the track plan at that point, of course. Ample protection against fire has been provided.



Galveston and Vicinity.

freight house at the eastern end. The necessary locomotive terminal facilities are at the east end of the large yards. They include an eight-stall engine house with shop adjoining, store house, coal chute, etc. In common with other roads in this region, the tracks are ballasted with oyster shells, which cost about 75 cents a yard in track.

The improvements made thus far, exclusive of the cost of

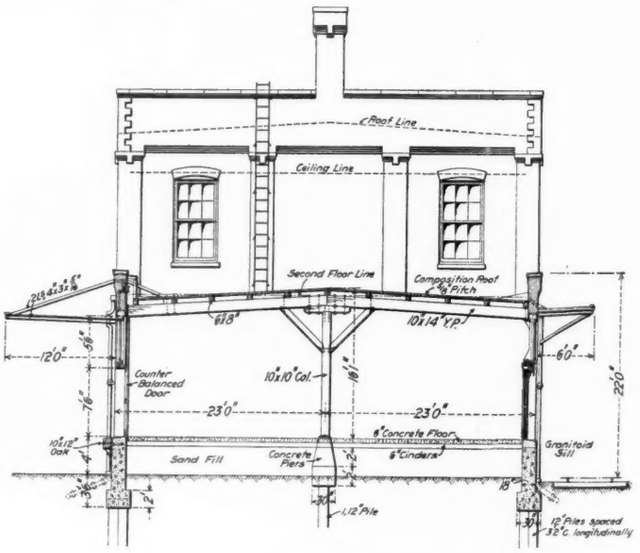


Track Side Elevation; Rock Island Freight House.

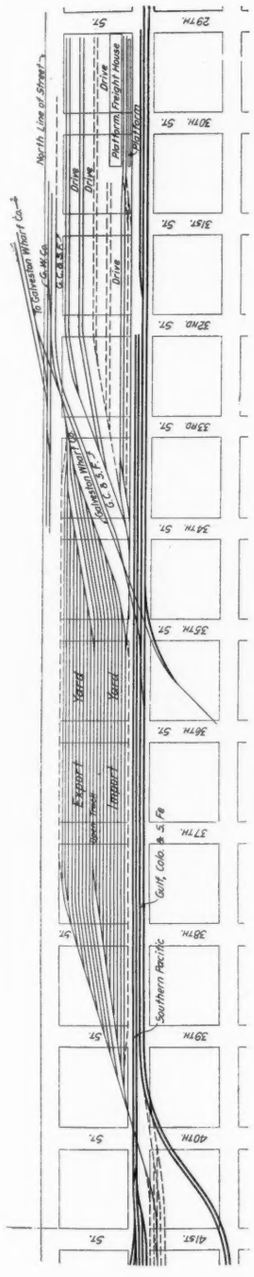
The distance of the large yards from the wharves of the Galveston Wharf Company necessitated the construction of the import and export yards adjacent thereto for quick deliveries to ships and the receipt of incoming cargoes. These yards lie between 33rd and 40th streets and connect at the east end to the tracks of the Wharf company. And even though the Rock Island expects in time to build wharves and docks of its own, it will still interchange a large amount of business with the Galveston Wharf Company and therefore will have permanent need for the import and export yards.

The terminal freight house, team tracks, etc., are at the extreme east end of the property. The freight house is 46 ft. x 300 ft., with a platform at its west end 46 ft. x 200 ft. The building fronts on 29th street and has a second story for offices for 110 ft. of its length. It is built of brick, with composition roofing, the foundations being concrete on piling. The floor is 6 in. of concrete on 6 in. of cinders over a sand fill. The first story of the office portion has the yellow pine flooring laid right over the concrete floor. The team side has Allith counter-balanced doors and the track side has parallel sliding doors. The 200 ft. platform is brick and concrete.

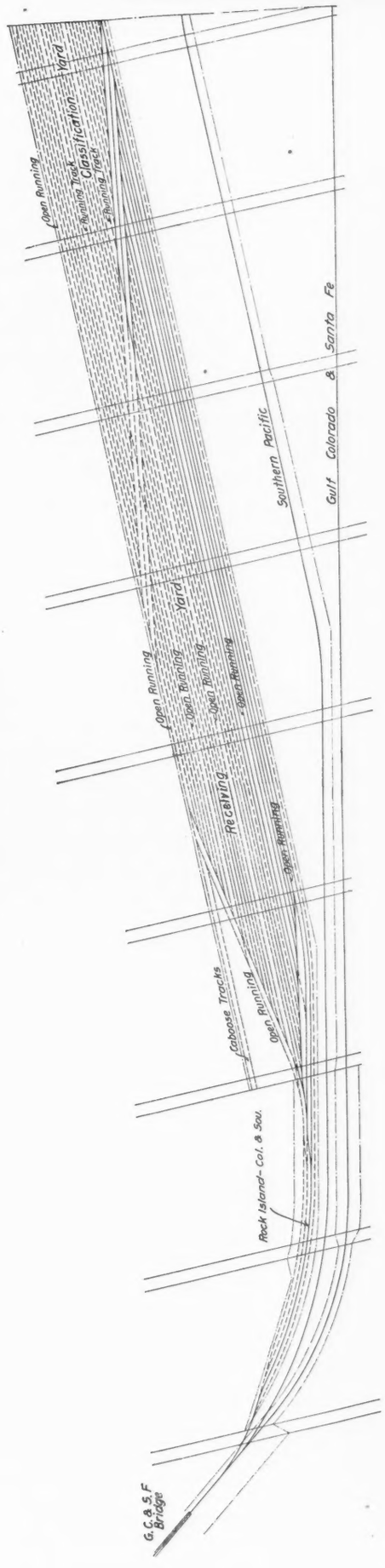
It will be observed that the yards are planned for a continuous movement from the west entrance to the wharves and

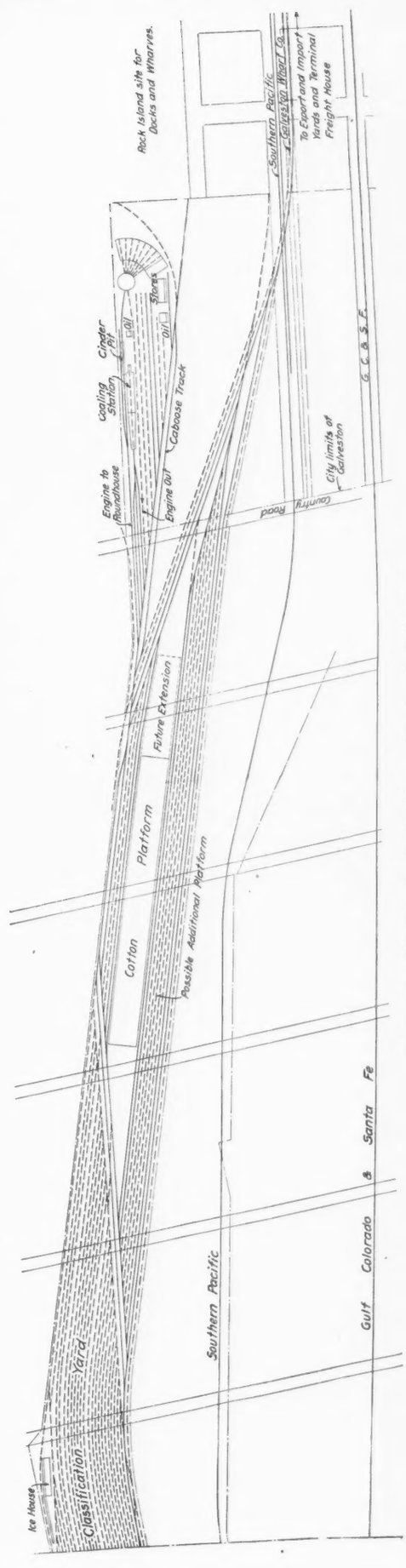


Cross Section Through Freight House.



Import and Export Yards.





Rock Island-Colorado & Southern Yards at Galveston.

the property, have amounted to about $700,000. We are indebted to J. B. Berry, Chief Engineer of the Rock Island, for data.

SOME GOOD IDEAS ON DISCIPLINE.*

The subject of discipline is one that has ever perplexed the wisest authorities, both civil and military. The commanders of crudely equipped legions early appreciated the value of systematic control. It is believed that continued improvement may be reasonably expected by the adoption of a more steadfast and educational policy.

While it is true that the applicant for military service need principally possess physical and intellectual qualifications, it is likewise certain that his undesirable attributes are subjected to more active supervision and impressive restraint than in other avocations.

For a service as important and necessarily exacting as that of the railway, demanding measurably the same control as the military with less influential corrective agency and more interference with policy, much greater care is evidently warranted, not only in the selection and assignment of recruits, but in their training, development and environment as well. If our service contains in its membership indolent, incompetent or discontented factors, it is due to their unwise employment and retention. More rigid investigation before acceptance into the service and more definite knowledge of performance of assigned duties thereafter with a firm policy of retention of only the worthy, would undoubtedly materially aid in the solution of discipline.

In our service, the term discipline is erroneously applied. Error or neglect and consequent suspension or dismissal is not discipline, but the result of lack of it. It would seem that our reports should be re-named and considered as "undisciplined service." If only employees who desire and intend to become skillful and reliable in the performance of duty as prescribed are engaged and such employees are subjected to consistent influence and properly encouraged to remain steadfast in such worthy and mutually beneficial intention, the absence of misdemeanor and the resultant punishment will be practical evidence of discipline. We must start out with the right class of employees first and then endeavor to keep them right thereafter. If then it is recognized that the employment of new members is fundamental your committee would recommend that only the ranking divisional officer should approve the issuance of application blanks, subordinate officers to select and recommend candidates for the service, but their entry into the same or filing of applications must be with the personal endorsement of the superintendent and the master mechanic of the respective departments.

Many of the present railway employees were selected and assigned by callers and clerks, and while some of the selections were excellent, some were doubtless undesirable. Much criticism can be directed to the method of investigation to determine if the applicant is worthy and if the employing officer is justified in approval of blanks. If the applicant cannot qualify as an industrious and respected citizen, and has been addicted to indolent and vicious practice, it could not be expected that the influences possible in the railway service would correct those characteristics. Either through the agent or other disinterested and reliable sources should such investigation be made and not through references submitted by the applicant.

All employment of untried and unknown persons should be probationary to enable the determination of at least two factors, namely, merit and capability; and not less than six months' time should be allowed to establish such conclusion, those serving less than that time not to be regarded as permanent employees.

It is believed that more importance should be attached to the employee's record and that from the beginning to the termination of his service, every employee should well understand that his record will be regarded as the most potent influence in case of error or misfortune, that no other agencies, either individual or collective, should properly be considered.

The performance of prescribed duty should reasonably be expected and required. In case of unusual or meritorious action to prevent error or disaster, employees should be properly credited with the same. All record credits however, should receive the same investigation as discreditable records, and must likewise be reported and approved.

We recommend that more consideration be devoted to instruction and examination. It is not sufficient that the college applicant be provided with a text-book and association with more advanced pupils; that is not enough to enable him to graduate with honor. Neither is it considered expedient to furnish the military recruit only with an arms manual and equipment and expect desirable results. No more should we depend upon our book of rules and experienced associations to develop reliable and competent employees. Absorption and intuition are beneficial, but without specific training and examination, that absorption and intuition unfortunately is liable to be of the wrong kind, it usually being easier to absorb the wrong than the correct methods. From the serious railway occurrences, one could well conclude that the wrong absorption had been rapid and thorough.

Your committee recommend an oral and a written examination for each person before approval of application and before employment, whether experienced or otherwise; that instruction and examination upon all pertinent rules be consistently maintained the same as is now practiced as regards air brake operation. No punishment should be applied by letter or in other than verbal form, after thorough and conservative explanation to interested party of the rule and principle involved. This practice is considered especially important because of the fact that many errors occur through lack of correct understanding and improper practice and custom; and in such cases any punishment imposed would be unproductive of beneficial results. There should be no difference of opinion as to the justice of the decision. An interview also presents a valuable opportunity to establish mutual respect and understanding between the employer and employee. Moreover, any punishment that is not educational alike to the individual and the entire organization cannot be regarded as correct discipline. The same should always be administered, not because of personality or damage sustained, but rather because of principle, and to avoid further disaster.

We recommend that if remission of discipline in any form is to be adopted, it be only consummated through the officer applying the same. Dismissal should be ordinarily final and only adopted with this understanding and after careful deliberation and consideration of all the facts and the employee's record and merits. We can no more afford to dismiss a good man from the service than we can afford to retain an inferior one, and he should be regarded as good or bad only as indicated by his record.

Controversies and misunderstanding of rules and instructions due to lack of either opportunity or inclination to obtain correct explanation and decision may be minimized by establishment of "question boxes" located conveniently for all classes of train, engine and yard employees. To avoid personality or embarrassment the inquiries need not be signed. At monthly meetings with employes, the same should be read and properly answered and explained; and we recommend the adoption of the plan.

In conclusion, it is desired to urge that investigations be thorough and fair; that to maintain discipline, officers must

*A report prepared by a committee composed of W. E. Morse, general superintendent, J. P. Cantillon, division superintendent, and G. J. Quigley, division superintendent, of the Chicago & North-Western, and adopted by the Chicago & North-Western Operating Officers' Association.

be well disciplined and recognize that example is usually quite as important at least as precept. Reasonable effort to afford employees correct environment and stimulate their interest in the mutual welfare by frequent assemblages at which, as now, practical matters of mutual welfare could be considered. These meetings would doubtless prove more interesting if special topics were selected for consideration and occasionally authorities upon particular subjects induced to address the gatherings. It is also possible to secure stereopticon forms by which to impress the pertinency of rules and prescriptions, which plan would possibly stimulate interest and consideration.

To develop the educational feature of discipline, it is essential that a correct general understanding be enjoyed. The same cannot be secured either from hearsay, gossip or chance representation. To insure this proper knowledge, we recommend publishment of each misdemeanor requiring suspension or dismissal and admonitory advice as a protection against repetition, eliminating names of offenders and character of discipline imposed. The information should be provided the employees interested in specific form and we advise the use of special bulletin boards at the regular established bulletin locations and by letter to intermediate locations for employees not enjoying bulletin advantages, the boards to be designated as "Instruction Bulletin," no other matter being allowed to appear thereon.

PROGRESS TOWARD CAR EFFICIENCY.*

BY ARTHUR HALE,
Chairman, Committee on Car Efficiency.

There are a great many people who agree that, theoretically, pooling equipment is a good thing in times of car shortage. There are a great many other people who practically go in for pooling cars without admitting it. Whenever the car of an eastbound road is used for a westbound shipment, the agent who sends the westbound car to the east is pooling cars, and it is an acknowledgment by the agent that pooling cars is the proper thing, and if the superintendent does not call the agent down the superintendent agrees that the pooling of cars is the proper thing. That is the sort of pooling that results when one road supplies the cars and another road uses the cars. But that is not the sort of pooling that Mr. Stuyvesant Fish recommended to the American Railway Association. He meant to propose a kind of pooling that would be fair and just to everybody. When we come to work out a plan for the use of cars in common that is going to be fair and just to everybody, people admit that it is a good thing in a theoretical way, but when we try to get it started it is a very difficult thing. There are two sorts of railroads in periods of car shortages—the debtor roads and the creditor roads—the originating roads which have to buy cars to ship anything and which generally try to buy the cars they need, and the distributing roads which generally do not buy as many cars as they need. It is natural for the creditor roads in time of car shortage to want their own cars back and they do not take much stock in the pooling scheme. The debtor roads do not want a pooling scheme because they want to go on using other people's cars. It will only be when the creditor roads find that the only thing that will insure them the use of as many cars as they own is some pool understanding that we shall get support for the pooling of cars. All our committee has been able to do so far in regard to pooling has been to show by its statistics and reports that in times of shortage of cars, cars are pooled.

When the committee was appointed we were confronted with what was usually called a car shortage. I have heard well informed men say that it was a motive power shortage. I have heard other people say that it was a shortage in general facilities. I have heard others say that on their roads it was not a shortage of locomotives or of general facilities, but a shortage in repair shops. Others have told me that it was a shortage in men—that they could not get enough men to repair their equipment and keep it going. I have known a few people to say that it was a shortage in brains. Now, I do not know which of those shortages it really was, but it ended in a car shortage, and the newspapers told us it was the worst one in history. But it has never been proved to me that the shortage of 1906 was the greatest car shortage in history. I think that we had a worse time in the east in 1903 after the anthracite coal strike than some of you gentlemen had in the west in 1906.

When the Car Efficiency Committee started its work, we asked about 50 roads to advise what their shortages, surpluses and congestions of cars were on January 1, 1907. When we got those figures we found that the shortage for the whole country had been something over 100,000; I think it was about 150,000. We got this figure by equating the 50 roads to the total number that are now reporting. On the other hand, there were of surplus cars and cars that were in the wrong place about 30,000. There were less than 100,000 shop cars, which was the normal number at that time. In May, 1907, the Association said it wanted the figures of surplus and shortage regularly, and since then we have got them every two weeks. We printed the shortages and surpluses until the surpluses got so tremendous we were afraid they would be used for bear points for the various railroad stocks, when we stopped printing surpluses.

There is a great contrast between what I am trying to give you now and the account I tried to give the Traffic Club of New York about a year ago. I can remember telling those gentlemen: "It may surprise you to hear it, but, excepting in some states for coal cars, there are practically no shortages in this country, and, gentlemen, we are approaching a time, in my opinion, when there will be a large surplus." That news was received with some incredulity.

The next thing to observe here is the influence of hard times on the shop cars. In 1907 the number of shop cars was usually about 100,000, or about 5 per cent. of the total number of cars. This year the number is running over 200,000, and while it is getting small now it is still over 10 per cent. The shop cars increased so rapidly in number in the early part of this year that I resisted the suggestion on the part of some of our people that we take the shop car figures. I really thought—you remember how bad things were in April and May—that I did not dare print the fact that there were over 600,000 idle cars in the country, this being the sum of the surplus cars and the shop cars.

It was a pretty hard thing to get the railroads to tell us in 1907 what their shortages were. It was a harder thing to get the surpluses for the period when everybody was afraid a shortage was coming on. It is easy enough now to get the surpluses because everybody feels there is always going to be a surplus. There is something about possessing a surplus of cars at a time when you think you are going to need the cars that makes it very difficult for a railroad man to give up information about it. I have walked down the street with a surplus of $10 in my pocket, and I have had an acquaintance ask me if I was "flush," and I have not acknowledged that surplus of $10. But at the same time it is a great pity that it is so difficult to find out about the surplus cars at a time when they are going to be needed. I am very much afraid that when the good times come some railroads will be concealing some small surpluses that they are holding for a rainy day. I have known agents to forget to report a few nice box cars that they would probably load to-morrow. I have known superintendents to forget to report 50 ore cars that they had on a convenient siding. This is natural, but this holding back of facts in regard to surpluses is something that holds us all back and makes very difficult, when shortages and surpluses become pretty near normal, the work

*Abstract of remarks before the Western Railway Club, Chicago, September 15, 1908.

of trying to fill the shortages with the surpluses. Every time the Committee on Car Efficiency can indicate to one road where a shortage can be filled from a surplus on another road, the Committee on Car Efficiency can justify itself over and over again, and whenever I see a shortage on one side and a surplus on the other, I feel the Committee on Car Efficiency is failing of its mission.

I was speaking about our failures in filling shortages with surpluses. There is another failure we have made. We asked all the railroads to report their congestions every two weeks, and we got very few replies. Railroads do not like to report congestions. They are afraid that if it is known they have congestions people will route freight away from them. But a great deal of harm comes from withholding this information. In the period when the roads were short over 100,000 cars a day, through some kind of a misunderstanding there were thousands of cars of coke loaded for Arizona standing on side tracks of the Southern Pacific, Union Pacific, Rock Island and all the roads between the Alleghenies and Colorado. The Committee on Car Efficiency was called down for that. We were told that we ought to have taken means to prevent this congestion. But the roads did not tell us of it. If we had known that thousands of cars of coke were standing on the roads leading to Arizona, I think we could have preserved 2,000 or 3,000 cars for filling shortages.

Besides the figures in regard to car shortages and surpluses, we have obtained a great many other figures from the railroads, tending to show the efficiency of railroads in particular and in general. We have a new figure—the ton-miles per car per day, and no less an authority than J. J. Hill told me, when I showed it to him, that on the spur of the moment he thought that was the best gage of efficiency. I hope that as these figures are compiled for more and more years they will become of much greater use, and if we think out other ways of indicating the efficiency of cars on railroads, we will have other columns of figures made. We welcome suggestions to make the figures better and we pay a great deal of attention to making them correct.

With respect to the average mileage of cars per day during the periods of shortages and surpluses: In April, 1907, the average mileage was 24.8. In April, 1908, it was only 19.6. That includes surplus and shop cars. The elimination of the surplus and bad order cars gives an average of 25 miles per day. In April, 1907, the average earnings per day of the cars actually in use was $2.56, while in April, 1908, it was $2.38, so we fell off in earnings per car per day although the mileage was about the same.

I need not say that car efficiency is a very different thing in times of car shortage and in times of car surplus. Nowadays about the only thing that can be done to improve car efficiency is to hurry the loading of cars. We have had so much greater periods of car shortages than of car surpluses that we cannot neglect, in these times of surpluses, the precautions which have been of use in times of car shortages; especially we cannot neglect the precautions we have taken to prevent our patrons from using cars unduly. The committee has corresponded with all the car service associations or car demurrage bureaus in the country. We have got all their views and all the rules promulgated by them and by the state commissions, and we helped the Car Service committee in framing the new uniform car service rules recommended by the American Railway Association about a year ago. We have taken up the question of the adoption of these new rules with the commissions and car service associations throughout the country. Those rules have been very widely adopted and where articles are accepted that are not subject to demurrage, especially where rail and water meet, we have kept the subject stirred up, and there is a great deal more demurrage collected at places of that kind now than there was two years ago. It has been very difficult within the last year, with the car surpluses confronting us, to keep the demurrage system going, but the Hepburn act and the various commissions have helped us very much.

It has been proposed a number of times that the usual free time of 48 hours allowed to shippers for loading and unloading be reduced. We have not seriously proposed a reduction of time to 48 hours at present, because there are so many exceptions in the various parts of the country, by which extra free time is given that we felt that the first thing to do was to get as many of those exceptions eliminated as possible and to bring the general time down to 48 hours. There is another reason which I think it is only fair for me to state. It has been shown in a number of cases that the railroads themselves have held freight cars, especially when loaded with coal, ballast, etc., the full 48 hours which they allow the consignee, and in many cases longer. This matter was brought to our attention a year and a half ago by one of the mercantile organizations of Chicago. They said: "Why do you make us unload in 48 hours when you are taking much more time for your own coal?" I have the figures giving the time that coal cars were held by all the railroads coming into Chicago, and I am sorry to say that the average delay was a great deal more than 48 hours. On some roads it was very much more.

There is a number of cases where our relations to the public have come up, as in cases where the public has insisted on using cars for small loads. We have made suggestions in regard to this matter to the traffic men, and they have succeeded in increasing the minimum loading in a number of cases. Besides that we have tried to keep on good terms with the various governments. It has been a little hard in some cases, especially where the state legislatures have been trying to do their very worst with us; but some of the commissions, and especially the Interstate Commerce Commission, have helped very much in the framing of fair demurrage rules, and in preventing the adoption of reciprocal demurrage, which is extremely unjust. In return, where the Interstate Commerce Commission has made rulings on car service matters that conflicted with our rules, we have tried to change our rules to conform to their rulings.

The last work that we have been on is of interest to the mechanical men. It involves interchange reports and, in a way, inspection. In order to form any large scheme for distributing cars we have to know where they are. We kept a record of the movement of cars on some of the railroads during the period of car shortage to see just where the cars were. The railroads disagreed among themselves, and we tried to find out directly from the interchange reports. We had a little success, but we would have had a great deal more if the interchange reports had been invariably correct. But the interchange reports are 1 to 2 per cent. wrong. There is a great chance for improvement of interchange reports, and that is one of the things the committee is still working on. We sometimes get reports from different places and check them against each other to find errors in that way, but latterly we have done more by going from place to place and seeing if the railroads, by getting together, cannot improve their methods of making up interchange reports. There are still a great many places where the delivering railroad takes one account of cars and the receiving railroad takes another account, and the inspector of the delivering road takes one account and the inspector of the receiving road takes another account. When you check three or four times you have to put pretty poor help on the work. If you put a first-class man to do even a clerical job, he will do it a great deal more accurately than you will have it done if you put two second-class men, or even four second-class men, on it. In Denver the interchange reports are all made by one bureau. Similar plans are being considered in other places. I hope that mechanical officers will consider the matter carefully and see if there is not a chance here to increase efficiency and economy at the same time. There is a place that I have in mind

where 500 cars are interchanged in a day. An average of 23 men are employed by the various railroads at this place to record and inspect the movement of those 500 cars. You who have interchanges here in Chicago know about how many men you ought to put on the recording and interchanging of 500 cars; and I am sure that you will agree with me that it ought to be less than 23.

MIDLAND RAILWAY ELECTRIFICATION.

The electrified line of the Midland Railway is the first single phase line in Great Britain. It consists of the double-track roads between Heysham and Morecambe, and Morecambe and Lancaster Green Ayre, and the single-track line from Lancaster Green Ayre to Lancaster Castle Station, the total length of single track being about 21 miles. The line passes under many bridges, mostly arches. The overhead construction is the Siemens type, similar to that adopted for the electrification of the Hamburg-Altona Railway, the chief difference being the new type of suspension of the catenary wire.

The contact wire is of the figure 8 section, and is run in lengths of from 800 to 1,000 yards. One end of each length of the contact wire is fixed through insulators to a terminal gantry, and the other end is attached through suitable pulleys, etc., to a weight of about 1,200 lbs. The fixed end is always that at which the train enters, and the weighted end that at which the train leaves; the tendency of the bow is, therefore, always to straighten the contact wire. The wire, which is 0.11 sq. in. section, was first installed with only 800 lbs. tension, with a horizontal stagger of 4 ft. (2 ft. each side of the center line of the coach), but experimental trials showed that it was necessary to increase the tension to about 1,200 lbs. for a 1,000 yards length, and that a 4-ft. stagger for a bow measuring from tip to tip 7 ft. 1 in. was too much for running at high speeds. The line is in a country swept by violent gales, and it is now considered that a stagger of 2 ft. is more practicable, though part of the line is run with 3 ft. stagger at present.

The height of the contact wire from rail level varies from 18 ft. 3 in. in the open to 13 ft. 3 in. under bridges. It is suspended by short loops about 4 in. long from a steel cable called the auxiliary wire. The loops are fixed to the contact wire but are movable on the auxiliary wire. The auxiliary wire again is held by the main catenary cables, of which there are two; the main catenary span being broken up into six short spans on the auxiliary.

The two catenary cables are clipped together throughout their length, except for about 3 ft. on either side of the insulator where they divide to pass through the grooves of a ring, the grooves being on opposite sides of the insulators. The catenary is free to move for this distance, and this equalizes strains due to unequal loading of spans; at the same time it is secure in case of the breaking of the wire, as has actually been proved by experience.

Section switches are provided to isolate the up and down lines, or to isolate the different branches. These switches are of the double break air pattern and are fixed on the top of the poles supporting the gantries. Each section switch is duplicated and the connection from one contact wire to the section ahead of it is by a short section of switch wire which must be connected to the two contact wires before the line is switched through at this point. This arrangement was adopted to get a duplicate break, and also to leave a short length of line into which a car can run without bridging, by its bow, two sections which might have to be isolated. There are similar switches at the various stations so that the overhead wiring can be grounded in case of emergency.

The gantries are connected by a separate overhead steel cable, which is grounded every half-mile, the same ground plates being used for lightning arresters of the horn type. This diminishes the number of plates requiring attention, and thus lessens the danger due to the poles being charged through a leaky insulator. This grounded steel cable has in each case been placed between the contact wire and the telegraph wires, and it is believed that its presence has had a great effect in reducing the electrostatic induction from the contact wire to the telegraph wires. So far, it seems that it will not be necessary to put open telegraph and telephone wires underground when high pressure traction systems are erected overhead. At the same time it will certainly be necessary to provide some sort of high resistance leak on any wire parallel to such a system.

The poles carrying the catenary system are mostly straight creosoted wooden poles, but at Morecambe Station and at one or two other points lattice steel poles and lattice girder gantries are required to carry the big spans. Where wooden poles are used the gantries are made of two angles, brought together at the ends but kept apart for the greater part of their length by distance pieces 1 in. thick.

The steel bolts supporting the insulators are encased with ebonite—an arrangement similar to that on the Hamburg line. The insulator itself is made in two portions and is very massive. The design of the insulator, in combination with the twin catenary cable, brings the side strain of the overhead gear below the level of the inside bolt. There is no point at which the catenary cable itself is deformed by the pressure of any clamp, and no point at which the wave motion set up in the wire tends to break it at a point of support.

The outer rails are all bonded, the bonds being of the Forest City type, in duplicate, and placed under the fishplates. At crossings and junctions all rails are bonded together, and these bonds, as well as those used for cross bonding, are ordinary copper cable. By using protective devices, it was found possible to go on with bonding in moderately wet or damp weather, but when the whole work was finished, tests of the resistance of each bond showed that although all bonds were up to high standard, those made in dry and fine weather were quite distinguishable, by resistance test, from those made in damp or misty weather. It will be interesting to see, as time goes on, whether this difference in resistance is intensified.

The rails are grounded at Heysham Harbor in the sea by duplicate copper plates. At Morecambe they are grounded at the end of the Midland Railway pier; these plates being also of copper, but protected by a large cast iron caisson recovered from an old Midland bridge. At Lancaster the rails are grounded to the cast iron columns of the bridge, resting in the bed of the river where water is always flowing. Recording ammeters were put at these various grounding points to indicate the proportion of current which returns by these routes.

The overhead wire carries 6,600-volt, single-phase alternating current, 25 cycles. There are no feeders other than the two contact wires. The line is fed from the existing power station at the Heysham end of the line, which has had added to it the necessary additional machinery to increase its capacity and to enable it to supply single-phase current, it being a direct-current station. This power station is that provided for working the cranes, capstans, lifts and other machinery, together with lighting, of the harbor at Heysham. Producer gas engines furnish the power. There are two producers, of about 750 to 1,000 h.p. capacity each. The engine room contained three 250 h.p. three-cylinder British Westinghouse Co.'s engines, driving 150-k.w., d.c., 460-volt generators. There was also a battery of 100-k.w. capacity for five hours. The existing load on the station, chiefly of high-speed, heavy motored cranes, is quite variable, and the battery has been used in conjunction with a Westinghouse automatic reversible booster for taking up the peak loads.

An additional 350-h.p., 235-k.w. Westinghouse engine and generator, also generating 460 volts direct current, has been installed. Two d.c.-a.c. motor generators made by the Electric Construction Co. transform the current to single phase.

The demand on the station will result in very heavy peak loads. The engines are intended, whatever the actual load they may have been carrying before the heavy loads come on, to work up to their full overload capacity, which is about 20 to 25 per cent. in the case of the old, and 10 to 15 per cent. in the case of the new sets, before the battery is called on to discharge heavily. The latter will, however, be called on to work up to its full one-hour rate of 750-1,000 amperes. The old battery booster not being large enough for these discharges, a new one has been installed.

The generators were made more flexible by fitting exciters, each mounted on the engine bed-plate and belt-driven from a pulley fitted on the generator shaft. The compound windings were fitted on these exciters, varying their voltage and, consequently, that on the main generator fields, so that the existing copper on the latter was fully utilized. The exciters are of 3 k.w. capacity, and of fairly high speed.

The Lancashire Dynamo & Motor Company's booster is of the firm's standard three-wire type. With a comparatively low continuous rating it satisfactorily commutates the peak discharges up to 750-1,000 amperes; it can be set to make the engines work up to their overloads or to work under almost any other conditions, without any serious drop on the bus bar voltage. The new generating set is the latest type of Westinghouse gas engine, being a three-crank engine with three sets of cylinders, two in tandem in each case. Its speed is 300 r.p.m.

The load on the motor generators varies from nothing to upwards of 1,000 k.w. in very short periods. The specification called for the machines to be each capable of a continuous output of 150-200 k.w. with a temperature rise of 80 deg. F., but they were also to be capable of safely carrying output overloads of 900 k.w. instantaneous, 600 k.w. for ½ minute, 500 k.w. for ¾ minute, and 300 k.w. for 2½ minutes, and were required to be also tested under a regular cycle of these overloads, with underloads in between, for eight hours. The internal driving losses were also required to be kept down, while on the alternating current side they were required to regulate within 6 per cent. on throwing off a non-inductive load equal to the full continuous load, and within 20 per cent. on throwing off a similar but inductive load of 0.8 power factor. Further, they were required, with the assistance of external means, if necessary, to restore the pressure to normal within 7 seconds of the coming on or throwing off of loads up to 600 k.w. at 0.8 power factor, or 300 k.w. at power factors down to 0.3.

The makers' specification was 175 k.w. on continuous rating, the machines on test being well within the specified temperature rise. Each of the sets has several times been subjected to loads up to 900 k.w. input without the slightest commutator trouble, and smaller overloads of 600, 500 k.w., etc., have been frequent, and have been carried with equally satisfactory results. On an average, after the switching on or throwing off of a heavy load the voltage is restored to its normal of 6,600 volts within three seconds, while the voltage even then only varies about 300 volts each way.

The direct-current motor is compound wound with commutating poles, the series winding being a very slight one, and put in principally to assist the two sets to run in parallel satisfactorily.

The alternator has a three-phase star winding, so that if one winding breaks down, the other two may be used for the single-phase supply; otherwise no use is made of the three-phase connections. The machine is of the standard internal revolving field type, and is excited from an exciter which is carried on the end of the bedplate and spur geared up to about 1,100 revolutions. This exciter has laminated fields and is compound wound, its series winding carrying a portion of the main motor current, so that (so far, at least, as varying loads of equal-power factor are concerned) the tendency of the alternator to drop in volts is thus compensated.

Compensation for varying power factors is effected by a regulator, designed and constructed by the Electric Construction Co., and the first of its kind, which inserts or extracts resistance from the circuit of the shunt field of the exciters by the action of solenoids, which are excited respectively as the voltage exceeds, or is less than, the normal.

The direct-current motor armature and the revolving field alternator are carried on the same shaft without any intermediate bearing. There are only two main bearings on the machines and these are ball bearings. These bearings have so far proved advantageous in reducing the starting current, which at 460 volts is only about 75 amperes, and the no-load loss, which is about 23 k.w. with the exciter and alternator fully excited.

Each of the motor generators is supplied from the low-tension bus bars through a no-voltage and overload circuit breaker. The shunt circuit is excited through a separate double pole knife switch, with kicking contacts and resistances. Starting resistance is cut out by a set of knife switches. With a throw-over switch these can be used to start either set of the machines, a heavy triple-bladed knife switch being thrown in finally when the machines are fully started up, connecting them direct to the bus bars.

On the alternating current side, each alternator is connected up to the bus bars by a hand-operated oil switch and the current passes from the bus bar through duplicate automatic circuit breakers to duplicate feeders passing out to the overhead lines. All the circuit breakers, both high and low tension, have time limit devices. The exciter shunt fields of the alternators are also connected through double pole switches with non-inductive contacts and resistances. The instruments used consist of an ammeter, on each of the direct-current motor circuits, and a voltmeter, ammeter and watt-hour meter on each of the alternator circuits, all operated through transformers. There is also an indicating watt-meter between the bus bars and the out-going feeders, and the regulator is connected to the same transformer.

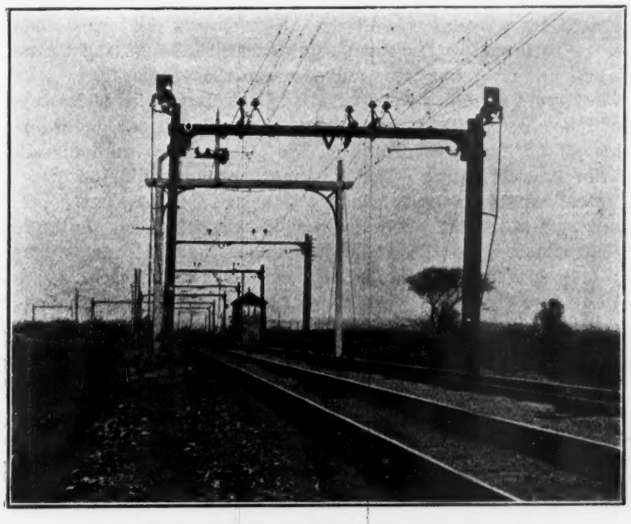
The high-tension apparatus is contained in a lock-fast expanded metal chamber, placed over and at the back of the actual switchboard, the switches being operated from the handles of the latter through rodding. The door of this high-tension chamber is interlocked with the holding-up coil of the motor circuit breakers, so that unless the door is closed neither motor generator set can be started, while if it is opened during running, everything stops.

The rolling stock consists of three trains. There are three motor cars, two with equipments by Siemens Brothers and one equipped by the Westinghouse company. The order was thus divided solely because Messrs. Siemens were supplying all-electric control, which was preferred by the railroad company, while the Westinghouse company preferred electro-pneumatic control apparatus; otherwise the proposals were equally acceptable. In addition to the motor cars, four trailer cars have been specially built, while one or more old bogie coaches will be used for carrying workmen, luggage, etc., particularly between Morecambe and Heysham. Each end of each of the trailers and of the motor cars is equipped with driving apparatus. This is necessary as the trains will vary considerably in length, the traffic varying widely from season to season and the coaches being liable to run in either direction, owing to the triangular junction, near one apex of which Morecambe Station lies.

The distance from Heysham to Morecambe is five miles, and from Morecambe to Lancaster four miles. There will be almost no direct running from Heysham to Lancaster. There is also a short extension of about three-quarters of a mile from Lancaster Green Ayre to Lancaster Castle. The distances, except the last-mentioned one, have all been increased by about a quarter of a mile since the scheme was decided on, the position of the station at Morecambe having been changed. The maximum services for which the trains are designed is a

20-minute continuous service between Heysham and Morecambe, and a 15-minute service between Morecambe and Lancaster, using a single train in each case. The trains will, however, not be worked up to anything like this service ordinarily.

There are no gradients of any importance on any section



Section Insulator Switches.

of the line except between the two Lancaster stations. There are, however, a number of speed restrictions near each of the three terminals.

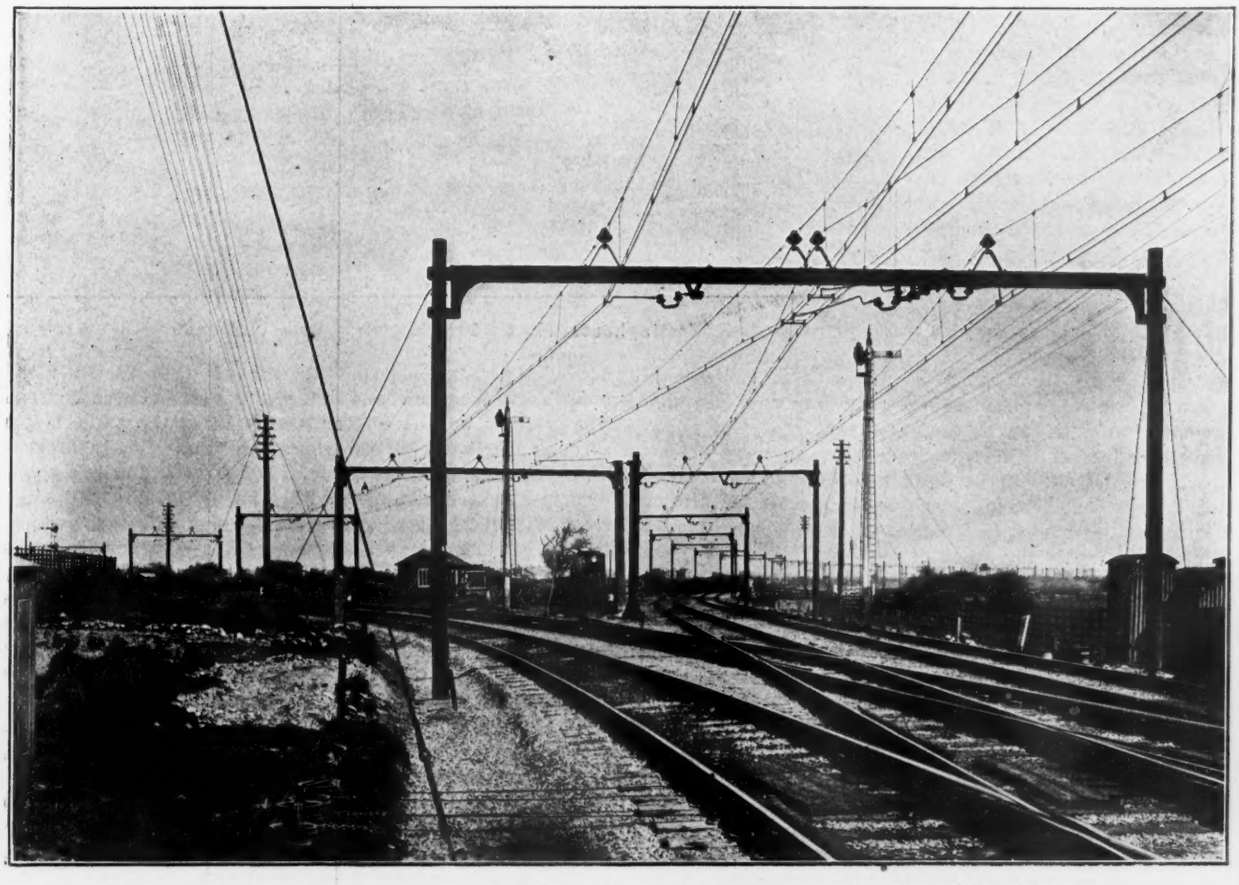
The motor cars are of the open central corridor type. They are 60 ft. long over end panels, and 9 ft. wide over all. There are three compartments with a total seating capacity of 72 passengers, the vestibule compartment at each end being reserved for driver and guard. Of the passenger compartments, the middle one, 25 ft. long, has the seats arranged transversely, while the other two compartments, each 13 ft. 5 in. long, have longitudinal seats to allow for trap doors in the floor for easy access to the motors, etc. There are hand straps in all the cars.

Ventilation is provided by drop lights in the upper part of the side windows, and "torpedo" air extractors in the roof.

The cars are lighted from the power current throughout; the motor cars are also electrically heated from the same source, but the trailers have not yet been fitted with heaters, as their extensive use during the winter months is not anticipated. The insides of the roofs are covered with millboard and painted white; the cabinet work is of polished oak, and the seats are covered with perforated sycamore.

The underframe is of steel Z bars and channels, with angle knees and gusset plates, and is supported with truss rods to hold the electric equipment. The trailing truck is of the Midland standard type, composed of pressed steel members. The wheel-base is 8 ft., and the wheels are 3 ft. 7½ in. diameter on tread. All cars are fitted with both hand and power brakes; the power brake is of the vacuum type, the pumps being driven from independent motors, and each trailing bogie wheel is braked on both sides.

The trailer cars have a length over end panels of 43 ft., and extreme width of 9 ft.; they consist of one long compartment with a driver's vestibule at each end. The seats are placed transversely throughout, and will accommodate 56 passengers. The interior finish, ventilation and lighting is similar to that of the motor cars. The underframing is light, as it has no electric equipment to sustain; the two trucks are interchangeable with the trailing trucks of the motor car, with



Torrisholme No. 2 Junction; Morecambe Line to the Left, Lancaster Line to the Right.

the exception of the springs, which are of lighter construction.

The motor trucks were built by the railroad company's locomotive department, and owing to the small number required have been specially built up of rolled sections and plates. The axles are of forged steel 6¼ in. diameter, parallel between the wheels and reduced to 4¾ in. in the axle bearing, the length of the journal being 9 in. The wheel-base is 8 ft. 6 in., and the driving wheels are 3 ft. 7½ in. diameter on the tread when new. As only a few cast steel wheels were required, an existing tender wheel pattern was made use of for the wheel center, and consequently the wheels are considerably heavier than is really necessary.

The brakes, as is usual in electric motor trucks, act only on one side of the wheels, lack of space making it impossible to adopt the standard practice of two brake-shoes per wheel. The shoes are hung from brackets on the bogie end frames, and are actuated by levers connected to bars running lengthwise under the inside top flange of the side frames. An arc-shaped cross bar connects these bars together and is coupled to the brake pull rod through a shackle and roller arrangement, which allows for the swiveling of the truck on curves without affecting the break gear adjustment.

The weight of the whole truck is 6½ tons, the extra weight of the wheels, however, accounting for about one ton of this.

The pump control gear has been specially arranged to prevent a train being moved without proper vacuum having first been obtained, as follows: The driver's brake valve is of special construction and is combined with a switch which operates the contactors controlling the pump. Current is fed up to this switch through one contact of a three-way plug, of which one of the remaining contacts is the feed wire from the auxiliary transformer, and the third goes to the master controller. It is, therefore, impossible to move the car by means of any of the controllers unless this plug is inserted, and its insertion automatically operates one of the pump contactors and starts it working at either the high or the low speed; most probably the former, as the driver's brake valve handle is removable, but can only be removed in full pump speed position. The use of this plug also ensures that only one controller throughout the train can be used at a time.

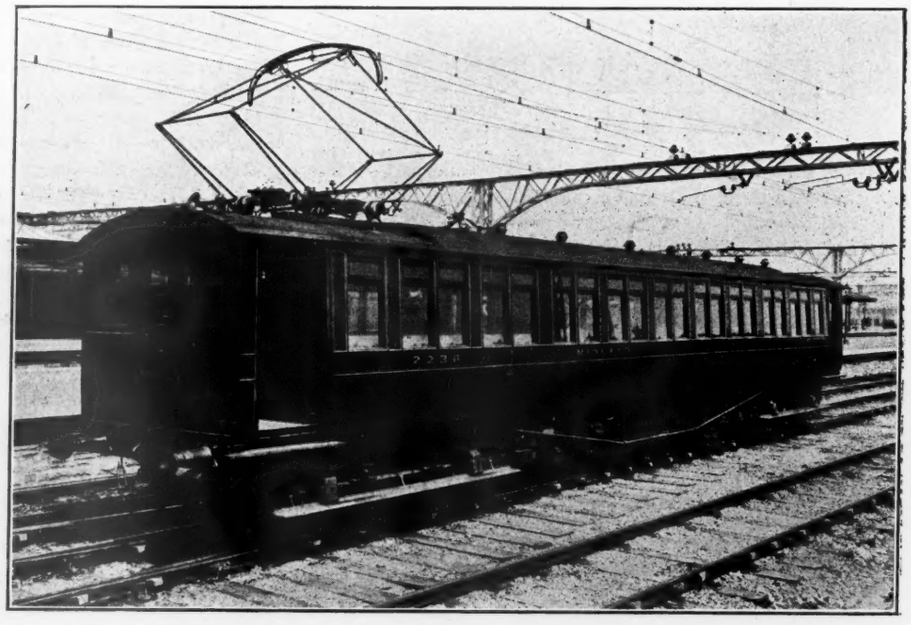
There is, of course, a driver's brake valve in every driving compartment, but it will be clear that only the valve and switch in that compartment which is being used for driving and in which the driving feed plug is inserted is operative for starting and varying the speed of the pump; but the brake can be *applied* by the guard at either end of every coach.

There is also fitted to each motor car an additional switch controlled by the vacuum which will trip the main circuit breaker in the event of the vacuum falling below about 15 in., this being decided on principally in connection with emergency applications of the brake by a guard, who will thus be given full control over the train. In addition to this, the switch also insures that motormen cannot start the train before taking off their brakes.

A horn, which takes the place of a locomotive steam whistle, is carried on each end of each motor car, and is electrically operated, the sound being produced by the vibration of a diaphragm by apparatus similar, but of greater power and more substantial construction, to the ordinary electric bell; a surprisingly loud and clear note is obtained in this way. The sound is multiplied considerably by use of properly designed trumpets. This horn requires far less power and much less complication than would be the case with a vacuum operated horn, and compares well with a horn operated by compressed air, which was not available on these cars. The vibrators are operated by a small 12-volt set of secondary batteries, the train wire for operating them being carried through the train in the ordinary train cable and through the jumpers.

The lights are in groups of six 24-volt lamps in series on the 150-volt auxiliary transformer control main. The two side tail lights, however, which are electric, are each direct on the 150-volt mains. These lamps are carried inside ordinary tail lamp lanterns, which are detachable and carry an ordinary water-tight plug, the socket being fixed on the end of the coach, just above the lamp-iron. Lamp irons, plugs and plug sockets are provided at each end of each coach.

The lamp in the driver's compartment is specially shaded so as to throw only a narrow beam of light on the vacuum gage and ammeter, thus allowing the driver to get a good view of the road outside, his compartment being dark. The shade is arranged so as to be opened when occupied as a guard's and luggage compartment, or as an entrance vestibule. The window on the left or near side of the train is that through which the driver views the road, and, in order to clear the outside of this window from snow and rain, a special scraper has been arranged, with a handle inside the compartment, so that by throwing this handle up and down the window is cleared. The scraper consists of a squeegee made of flat rubber on edge.



Westinghouse Motor Car, Showing Bow Collector.

There are two motors on each motor truck. The normal train was specified to consist of a motor car and two trailers, the weight of these being, without any of the electrical apparatus or the mountings for the same, 25 tons for the motor car and 17½ tons for each of the trailers; the motor car seating 72 passengers and each trailer 54, the respective standing capacities being 58 and 36, giving a total maximum capacity, without encroaching on the vestibules, of 310, with a total of 180 seats. It was specified to the contractors that they would be permitted to run at 25 miles per hour round the speed-restricted curves. The capacity of the motor car was to be such as to enable it to take on occasions two additional main-line

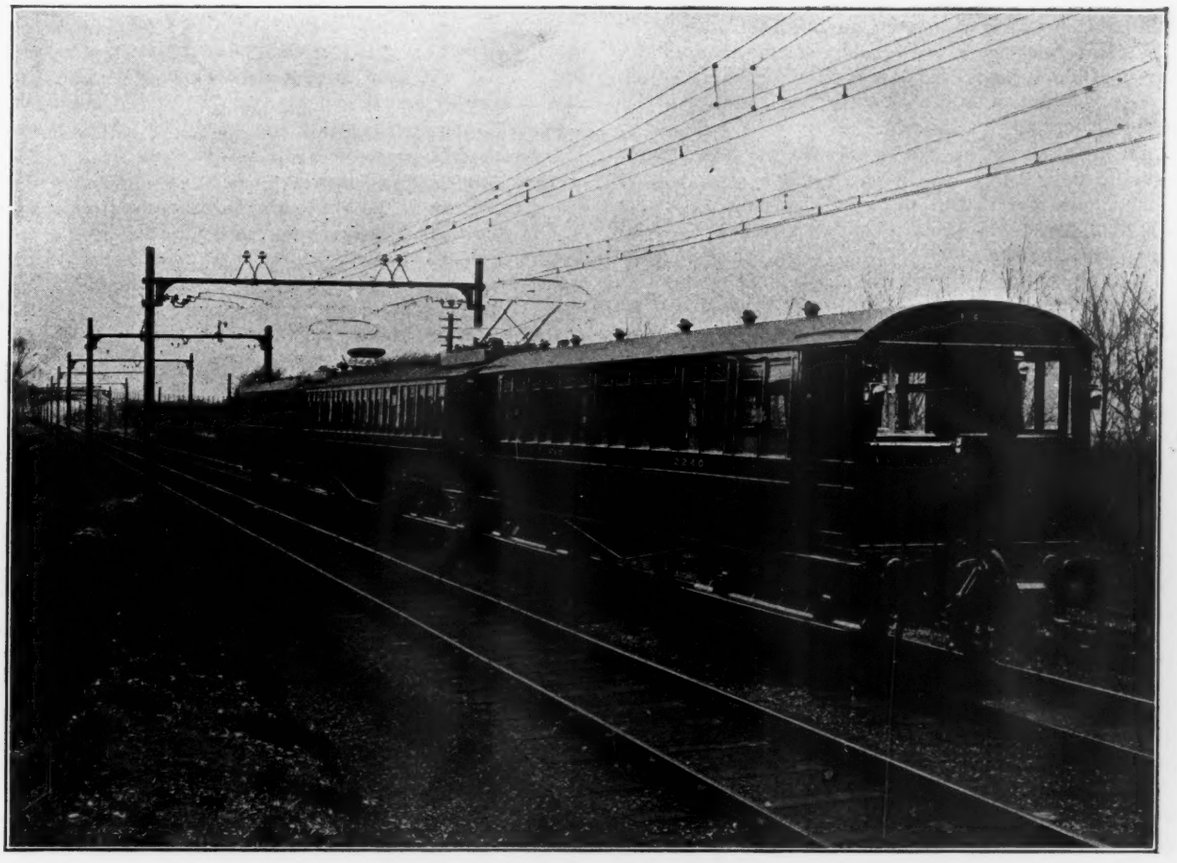
coaches weighing 26 tons each, and was also to be capable of climbing with its train the gradient from Lancaster Green Ayre to Lancaster Castle occasionally.

The specification also called on the contractors, should the order for the coaches be divided, to make their equipments capable of being worked from the same master controllers, and though considerable difficulty had to be got over in order to meet this condition, it was found possible to work the Siemens equipments in conjunction with the Westinghouse one in this way. Each contractor furnished such of their standard size motors as came nearest the railroad's specification of 150 h.p., the Siemens motors being nominally of 180 h.p. and the Westinghouse motors of 150 h.p. The motors were to be able to deliver their declared output for one hour with a temperature rise not exceeding 135 deg. F., and they were also required to have a temperature rise not exceeding 90 deg. F. on any portion after having run the three coach train for six double trips as per the schedule above mentioned from Heysham to Morecambe, Morecambe to Lancaster, and return. Overload and other similar tests were also specified.

The main transformer was required to conform to the same test conditions for heating as the motors, an auxiliary transformer being specified to provide for the supply of current for lighting, heating, and working the control apparatus and brake pump, this transformer having a three-hour test specified, it being subject to continuous working.

The Siemens cars have two collector bows to ensure continuous contact. It was found impossible to get the firm's standard bow (which is of inverted pantagraph type) into the restricted space at disposal between the coach roof and overbridges, and a type of bow has been adopted somewhat similar to the Continental tramway type, but having a small auxiliary bow at the end controlled by parallel motion. This bow, while appearing somewhat simpler than the standard bow, and requiring less room, while fairly satisfactory in working, has the disadvantage that it requires balancing by a wind screen. The Westinghouse bow is of the standard pantagraph type, a single bow only being used, and this goes into the available space fairly well. Both makers' bows are purely spring controlled so far as their working is concerned; the Siemens bow, however, is lowered by a master spring, which can be thrown out of action by a vacuum cylinder. The Westinghouse master spring is controlled as regards raising and lowering by compressed air, a special compressor being installed in connection with the control gear. A small hand pump has been installed in each case for raising the bows when first starting out in the morning, or at similar times when no compressed air or vacuum is available. The two Siemens bows can be raised or lowered separately, and the vacuum for holding them up is obtained from the train pipe through a ball valve, so that when the brakes are operated the vacuum remains on the bows.

The roofs of all the coaches have been covered with a grounded wire netting, so as to throw out the station circuit breakers in the event of the overhead wire coming down on the roof. The efficacy of this has been actually and satisfactorily tested in practice.



Siemens Motor Car and Two Trailers.

On the Siemens cars, the high tension wire runs into the high tension chamber, the door of which is mechanically interlocked with the bows so that it cannot be opened unless the bows are down.

The low tension wiring is carried longitudinally between the two girders forming the center members of the underframe, and it is supported between these two members in wooden frames spaced about 18 in. apart. The low tension cables themselves are not carried in metal tubing, as the high tension ones are, as probably eddy current troubles would arise if they were, but they are substantially surrounded with metal, and the coach body and its frames are all covered with sheet iron and asbestos wherever cables are run underneath.

The train cable is carried along the outside of the coach

alongside the side sill in a metal tube, being carried round the bends in flexible metallic tubing.

The respective weights of the two motor coaches are as follows:

	Siemens		Westinghouse	
	Tons.	Lbs.	Tons.	Lbs.
Carriage body work	13	560	13	560
Carriage truck	4	1,120	4	1,120
Special supports	1	672	0	1,904
Motors with gear and gear case	6	560	5	1,232
Main transformer	2	1,624	2	1,232
Aux. com. transformer and preventive coil	0	2,184	0	1,064
Pumps and compressors	0	1,064	0	1,792
Contactors and chambers	1	280	0	1,092
Other sundries, including bows, blowers, controllers, etc.	3	784	2	1,092
Motor truck	6	1,232	6	1,232
Totals	40	1,124	37	1,120

The Siemens equipment consists of the two motors, the main transformer, the auxiliary transformer, preventive coil, and commutating transformer, high tension circuit breaker and fuse in the main transformer circuit, high tension fuse in the auxiliary transformer circuit, contactors, motor fuses which also act as motor cut-outs and low tension fuses in the circuit feeding the control, and also a low tension fuse in the circuit feeding the fan.

There is intentionally no fuse placed in the brake pump main circuits, the cables for which are carried in special heavy section tubing, so that if anything goes wrong on the pumps the main high tension fuse will be blown and it will be impossible to work the car.

In tests at the makers' works, at 180 h.p., and with forced draught, the motors were much under their guaranteed temperature rise, and did not exceed this temperature rise when tested at this h.p., with natural ventilation on the stand. With forced draught, and with only 300 volts on their terminals (the full voltage being 340) they were tested under the specified temperature rise at 200 h.p., corresponding at full voltage to fully 225 h.p. They were also tested for continuous operation at 250 volts, which was chosen as being a mean operating voltage, giving 105 h.p., for five hours with a temperature rise of only 115 deg. F., so that at full voltage, allowing nothing for the improved ventilation at the higher speed, the machine can give continuously nearly 150 h.p.

The sparking tests were equally satisfactory, there being no objectionable sparking at a current of 1,100 amperes at 300 volts, which corresponds at full voltage to 350 h.p., and a torque of fully 2½ times that at the rated h.p. of 180.

The commutating transformer, while apparently an additional complication, probably pays its way in effectiveness, as the sparking of these Siemens motors, both on test and during actual running on the line, has proved to be quite as good as that of any, and better than that of many, d.c. traction motors; in fact, during the testing on the line, currents of over 1,000 amperes per motor have been frequently applied without any demonstration at the commutators, even just at starting, the brushes on the latter portion of the acceleration, and during free running, being absolutely dark.

The operation of the contactors is also satisfactory, and gives none of the trouble that has been prophesied in various quarters for single-phase contactors in the way of humming and chattering, excessive size, etc., though they are more liberally designed than will probably be adhered to as standard practice.

The master controllers are of fly-back or dead-man handle type, being, however, somewhat different from the usual design, inasmuch as the release of forward pressure on the handle by the driver trips the whole of the contactors at once, no matter on what stop the driver may be working at the moment, and without his allowing the handle to come back to the "off" position. This makes as safe a handle as one of this type can be, though the occasional sudden throwing off of heavy loads in this way is a somewhat severe tax on the regulating properties of the power station.

The Westinghouse equipment consists of motors, transformer, and auxiliary transformer, preventive coil, h.t. circuit breaker in main circuit, fuses in auxiliary h.t. and l.t. circuits, contactors and control gear.

The motors are ordinary straight series, compensated without any special commutating device other than the commutator resistance leads, the equipment, as a whole, being very simple but effective. The commutating performance on the line of these motors is excellent, and also as good as—if not better than—most ordinary heavy d.c. traction motors, while the commutator remains in quite as good running condition as that of any such motor.

The contactors are electro-pneumatically operated, as are also the raising, lowering and locking gear of the bow, and to supply these parts a small compressor is installed in addition to the vacuum pump. This equipment also was tested at the makers' works, the temperature rise at the end of an hour's full load of 150 h.p. with single-phase current being well within the limit, while overloads up to 1,200 amperes, corresponding to 195 h.p. at full voltage, and 2¼ times as great as the normal full load torque, were applied without causing injurious sparking.

The forced ventilation for the motors of both sets of cars has been fairly simple to arrange. For the Siemens car the suction duct has been carried inside the car under one of the seats, the whole of the air coming in this case from the inside of the car. The Westinghouse car has a similar duct inside, but as more air is required for these motors there is also a suction duct with a filter taking air from the outside of the car. In both cases this duct comes direct into the suction eye of the fan, and the delivery duct after leaving the fan splits into two pipes, one of which crosses to the other side of the coach and comes up under the longitudinal seat on that side, thus getting across the cross-member of the underframe, and coming down again above the motor, to which the air then proceeds through a rubber concertina pipe. The other half of the duct proceeds direct up under the longitudinal seat on its own side, coming down in a similar way to the other motor.

The auxiliary transformer was adopted chiefly at the instance of Messrs. Siemens as better suiting their control gear and partly to obviate any possibility of the lights in the coaches being put out by the coming out of the overload circuit breaker in the h.t. circuit, or by any other accident which would cut off supply from the main transformer. Also, during a great portion of the year the cars will be lying in the stations for long intervals between running and an appreciable saving of energy will be effected by doing away during such stoppages with the magnetization losses of the large transformer. On the Westinghouse car, however, at the instance of that company, the main transformer is kept continuously energized except when the main circuit breaker comes out on overload.

The auxiliary transformer might be dispensed with in cases where the cars are in continuous service, and this would also save some amount of h.t. apparatus.

On the Westinghouse car there is no interlocking of the h.t. chamber with the bow, the h.t. circuit breaker and fuse being put in lock-fast cases, the keys of which are kept at headquarters so that the train staff are not permitted access to these chambers at all.

In a test with a two-car train weighing about 58 tons, made incidentally in the course of ordinary running, one of the Siemens cars attained speeds of 30 miles per hour in 41 seconds, 48 miles per hour in 80 seconds, and the free running speed of 60 miles per hour in 160 seconds, starting, and running for 440 yards after starting, on an up grade of 0.5 per cent., there being, however, thereafter about 100 yards of level, and then a down grade of 0.2 per cent. for 1½ miles; this portion of the line is also considerably curved. These tests are not the most favorable that could be obtained, as the motors were not being worked to their utmost capacity.

THE WEST AFRICAN GOVERNMENT RAILWAYS.

BY FREDERIC SHELFORD, B.SC. (LOND.), M. INST., C.E.

The vast extent of the Continent of Africa is difficult of realization, even by those who have traveled over parts of it. The size of it is as difficult to conceive as the figure of a million. If the latter is regarded as ten one hundred thousands it seems easier to grasp, and in the same way the Continent of Africa seems to require dividing into its component parts before its dimensions can be appreciated. Thus it is easier to talk of such indefinite subdivisions as South Africa, West Africa and East Africa than of Africa itself.

The continent offers almost every conceivable diversity of climate, from the fetid swamps of the Niger to the snow-clad heights of Ruwenzori, of rainfall from the rainless tracts of the Sahara to the torrential rains of Sierra Leone, of civilization from the Fulani of Northern Nigeria to the delta tribes of Southern Nigeria.

We know as a fact that the land of the Pharoahs and the oil-bearing territories of the Niger Delta are on the same continent, but to one who knows both they might be as far apart as the poles. In climate, topography, history, manners and customs there is really no resemblance between them, and although no ocean of water divides them their divergencies may be attributed to the vast extent of sandy desert which lies between them, more formidable to cross than the ocean itself.

I am dealing in the following notes, at the request of the editor of this paper, with West Africa and its railways.

This in itself is a vast subject, for that part of the continent loosely called "West Africa" is an enormous area with indefinite boundaries. Anywhere from Morocco to Lobito bay may be called "West Africa," and the landmost boundary may be placed wherever one wishes without offending the most susceptible. However, as there must be some sort of limit one may say that West Africa is composed of the following:

British Possessions.—Gambia, Sierra Leone Gold Coast, Ashanti and Northern Territories, Southern Nigeria and Northern Nigeria. (The two latter together have an area of one-fifth of that of India.)

French Possessions.—Senegambia, French Guiana, French Soudan, Ivory Coast, Dahomey and the French Congo.

German Possessions.—Togo Land and the Cameroons.

Other States.—Liberia, the Belgian Congo, and Angola. Nearly, but not quite, all of these colonies, protectorates, and dependencies now possess railways, without which their development would be slow indeed.

In many parts of Africa the population is dense, the people more or less imbued with trading instincts, the soil is fertile and the climate conducive to luxuriant growth of all kinds of fruit, timber and other indigenous products. But this natural luxuriance is of little use unless means of transport by land or water are provided. It will be sufficient for me to deal in these articles with the British posssessions and their railways.

To write upon the subject of British West African railways would have been a simple task 10 or 12 years ago, for at that time there were very few railways to be described in British West Africa, and indeed, except for the somewhat nondescript railway from St. Louis to Dakar there were no railways of importance in West Africa at all. The task is now a greater one, but not as formidable as it may prove to be a decade or so hence.

The British West African railways constructed, or in course of construction, are as follows:

Sierra Leone	256 miles.
Gold Coast	228 "
Southern Nigeria	428 "
Northern Nigeria	400* "
Total	1,312 miles.

*Little has yet been done on this.

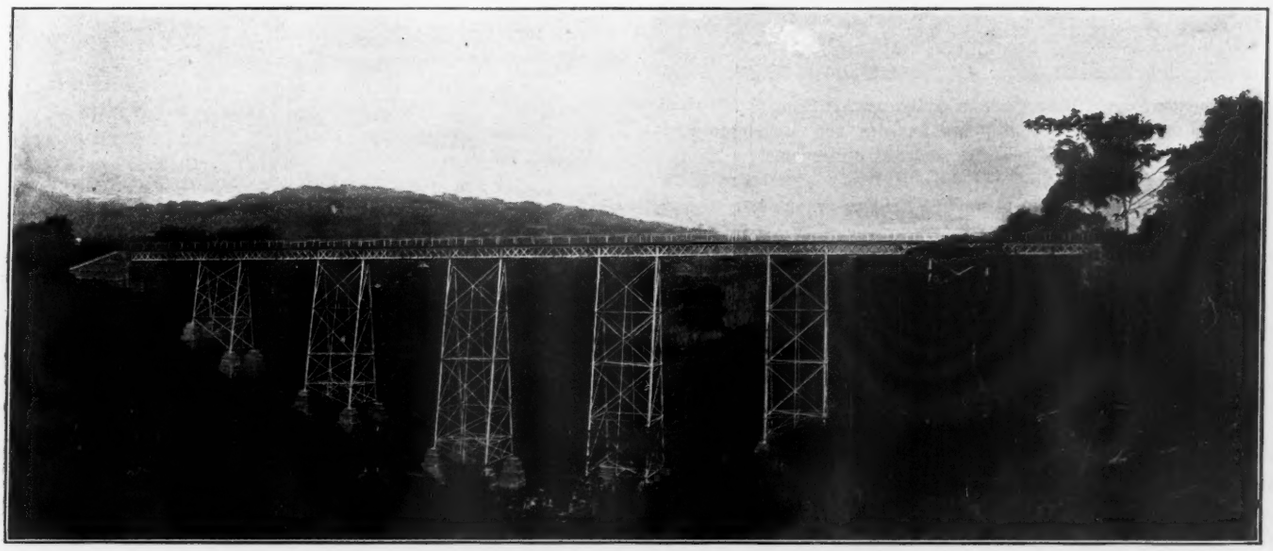


Fig. 1—Maroon Viaduct, Eighty Feet High.

The mileage is not yet large, but it is likely to be increased before long.

SIERRA LEONE GOVERNMENT RAILWAY.

The start in British West Africa was, curiously enough, made by the colony the least fitted, to judge by the standard of wealth, to undertake so great a work. The Sierra Leone government was, in fact, the first to undertake the construction of a railway connecting the port of Freetown with the interior.

Seeing that there was no experience in the colony as to the attitude of native labor toward larger works, or the effect of the climate upon such an undertaking, it is really satisfactory to find that such a work was brought to completion in the full glare of publicity without serious criticism being passed upon it.

It is true that the wisdom of selecting a 2 ft. 6 in. gage has been questioned by passing travelers visiting the colony in an unofficial capacity; but now, some thirteen years after its commencement, no argument has yet been made good to prove that the gage should have been other than it is. The gage is, in fact, capable of carrying the traffic. The line now pays its

working expenses and a large part of its interest charges, but it is still necessary to take into account the increase in the colonial trade and revenue due to the construction of the railway, to show, as is certainly the case, that it has been well worth while for the colony to build its main line.

The colony is entirely isolated from other British possessions, so that the question of a standard gage is not likely to become urgent for a long time to come, and it is probable that a broader gage would probably not have served the purpose of the colony as well as the present line has done.

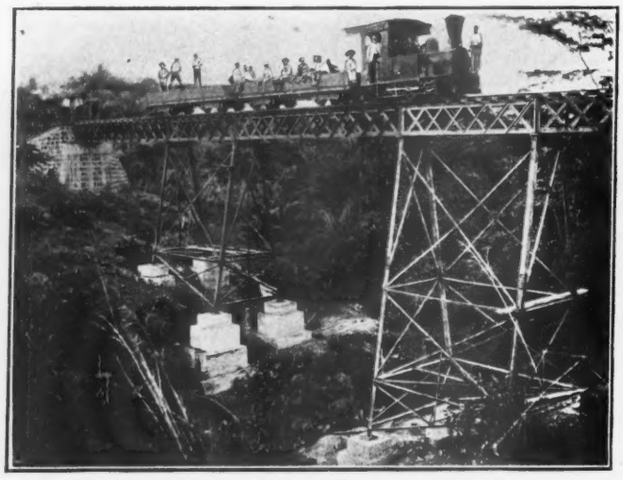


Fig. 2—Robiss Viaduct.

The history of the Sierra Leone Railway extends a long way back, but its originator may be said to be the late Major Festing, who, while upon a political expedition into the interior, was struck by the possibilities of the country and suggested that a railway should be constructed.

In 1893 the then Secretary of State, Lord Ripon, authorized the despatch of a survey party to the colony. The party was organized by the late Sir William Shelford, and was placed in charge of Mr. W. Bradford, who carried out a reconnaissance survey from Freetown in a northeasterly direction to Bumban.

In 1896 the first section of the line to Songo Town (32 miles) was authorized and was promptly begun. The country was difficult and numerous ravines called for a corresponding number of steel viaducts, one of which is shown in Fig. 1.

This section was completed in December, 1898, and the next section begun, and the railway continued to advance in sections as funds became available.

In 1900 the line was completed to Rotifunk, 55 miles; in 1902 it reached Bo, 135 miles, and in 1903 the railway was completed to Baiima, 222 miles from Freetown.

Operations were brought to a complete standstill by a native rising in the latter part of 1898 which involved part of the country through which the railway now runs. The natives, either really incensed at the imposition of a hut tax or making it an excuse for turbulence, played havoc with some of the white inhabitants and their property, and drove the railway engineers back to Freetown for a space. Little or no harm was done to the railway, however, and after military operations had been concluded, with the object of punishing the offenders, railway building was continued.

The bridgework upon the railway was heavy, as the following list of the principal bridges will show:

Works of interest.	Mileage, miles.	No. of spans.	Total length, ft.
Freetown to Songo Town:			
Nichol brook	0.97	9	281
Kissey brook	4.90	6	280
Wellington brook	7.50	7	312
Calaba brook	7.96	5	158
Robiss brook	8.20	4	162
Orogou viaduct	11.80	6	386
Maroon viaduct	12.97	7	330
Hastings viaduct	13.62	7	294
Rokell viaduct	16.19	3	94
Gaddon viaduct	16.80	3	94
Lewis viaduct	17.17	4	126
Allamangey viaduct.	18.30	5	182
Songo Town to Baiima:			
Ribbi bridge	38.80	9	662
Bumpe bridge	55.50	2	63
Mongire bridge	61.75	2	63
Makora bridge	68.15	2	63
Yambutu bridge	76.62	3	158
Bangue bridge	79.00	3	232
Taia bridge	106.54	10	589
Tabe bridge	118.50	4	233
Bebeye bridge	148.19	5	262
Sewa bridge	160.62	6	718
Male bridge	175.60	4	233

Fig. 2 shows the Robiss viaduct and Fig. 3 the Sewa bridge, which is one of the most important on the line.

The maximum grade is 2 per cent. (compensated) and 17 deg. curves.

The permanent way consists of 30-lb. rails keyed to steel sleepers.

The stations are of the simplest description, giving accommodation for a station master, together with simple station offices. Views of two classes of station are shown in Figs. 4 and 5. The rolling stock has all been supplied from British

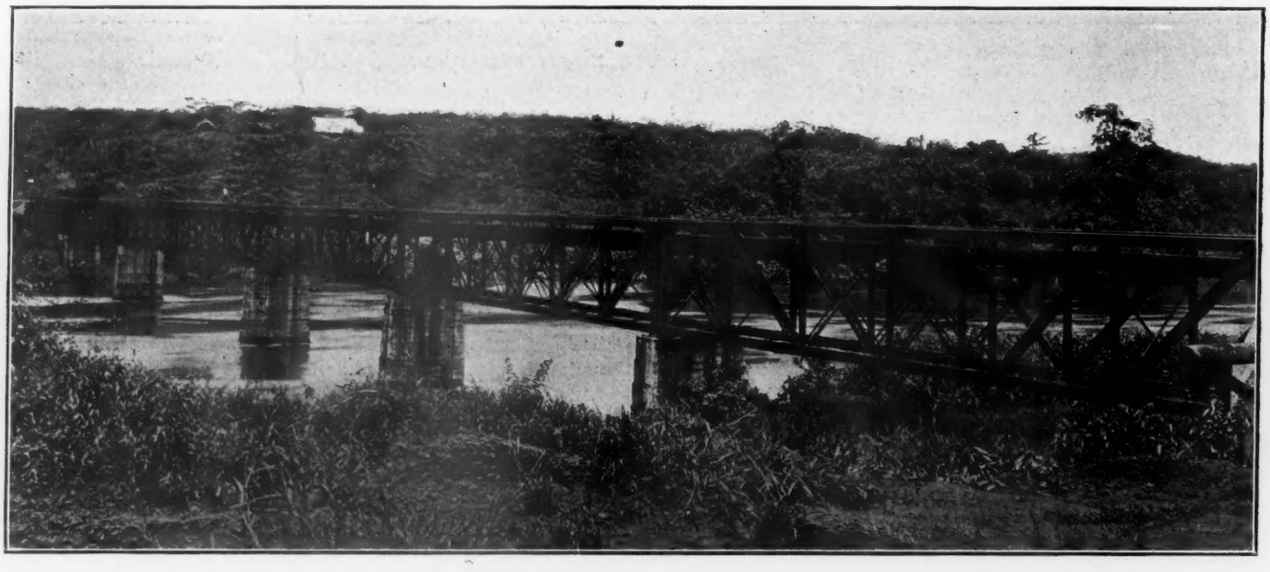


Fig. 3—Sewa Bridge, 718 Feet Long.

workshops, and was something of a novelty for a 2 ft. 6 in. gage line.

The locomotives were all supplied by the Hunslet Engine Company. The principal types are:

Class A.—Six coupled with leading and trailing ponies; cylinders, 10 in. x 15 in.; grate area, 6.25 sq. ft.; heating surface, 312 sq. ft.
Class B.—Similar to Class A, but with a larger boiler, giving 381 sq. ft. of heating surface
Class C.—Eight coupled with leading and trailing ponies; cylinders 12 in. x 16 in.; grate area, 10.7 sq. ft.; heating surface, 485 sq. ft.

A photograph of one of the Class A is given in Fig. 6.

The wagon stock, with the exception of ballast wagons, is entirely bogie. Leeds' Forge bogies and timber underframes are the most common type. The wagons are 12 tons gross and tare about 4 tons 2 cwts.

Fig. 7 shows an open bogie wagon fitted with a sliding top of corrugated iron to protect traffic consisting of tropical produce. The carriage stock was a good example of what could be put upon the gage. Most of it was built by the Bristol Carriage & Wagon Company. Views of the carriage stock are given in Figs. 8 and 9.

The first is a composite corridor carriage upon pressed steel bogies and a timber underframe. The latter is a third-class car for native passengers.

The coupler employed for wagon and carriage stock on all the West African railways is one which may now perhaps be considered to have earned the name of the "West African Railway Coupler." This coupler is not automatic, but has the advantage of having one helical spring in compression both in buffing and drawing, and the whole is entirely self-contained outside the headstocks. Broken hooks are rare.

The Sierra Leone Railway has one branch which runs from the Freetown terminus up the mountain (Sierra Leone, the "Lion Rock") which towers high over Freetown. It was thought desirable to allow European officials an opportunity of escaping from the suffocating heat of the town after office

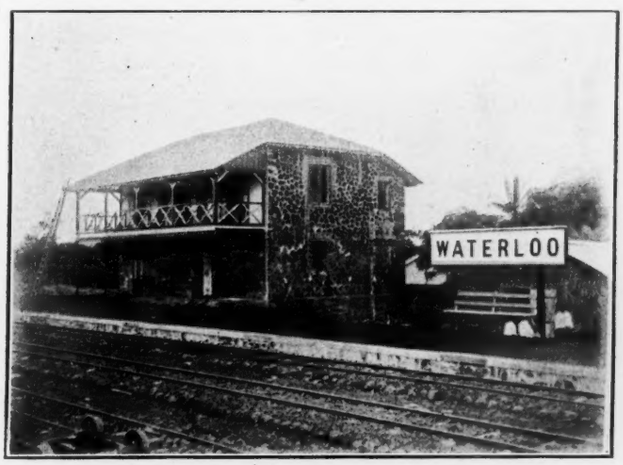


Fig. 4—Typical Roadside Station.

Fig. 5—Type of Larger Station.

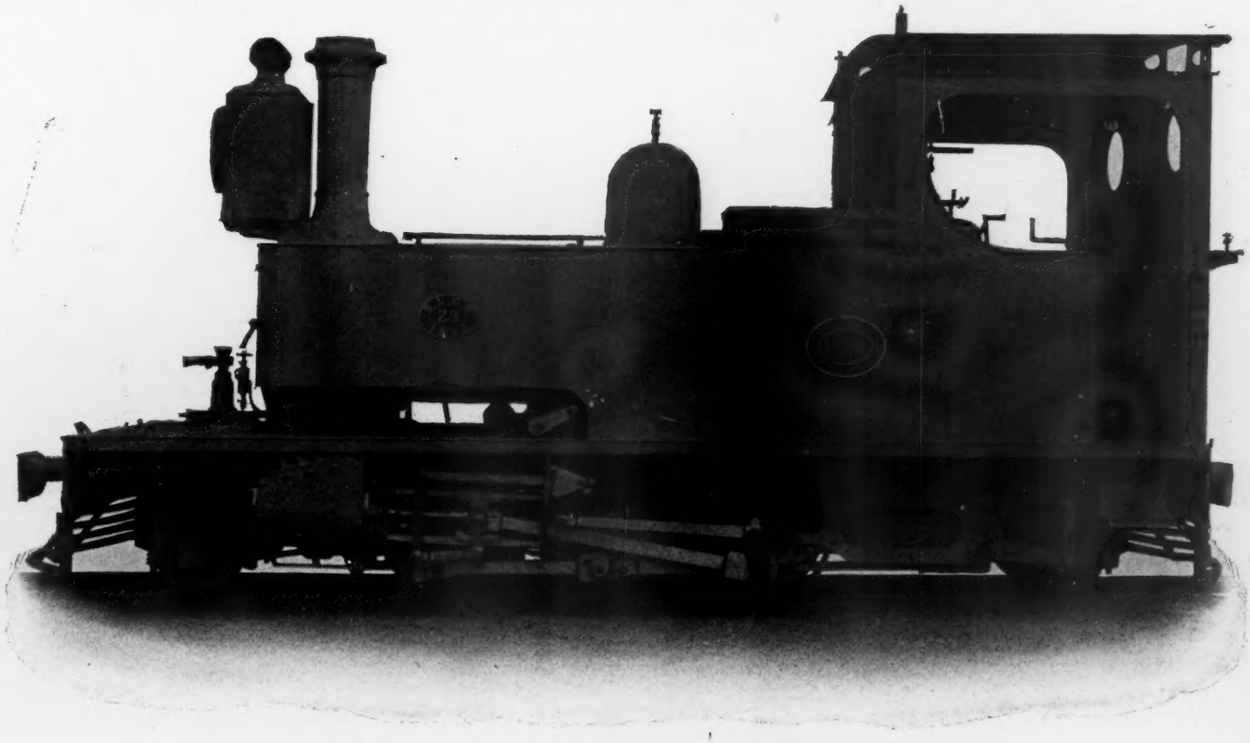


Fig. 6—Class "A" Type Locomotive; Sierra Leone Government Railway.

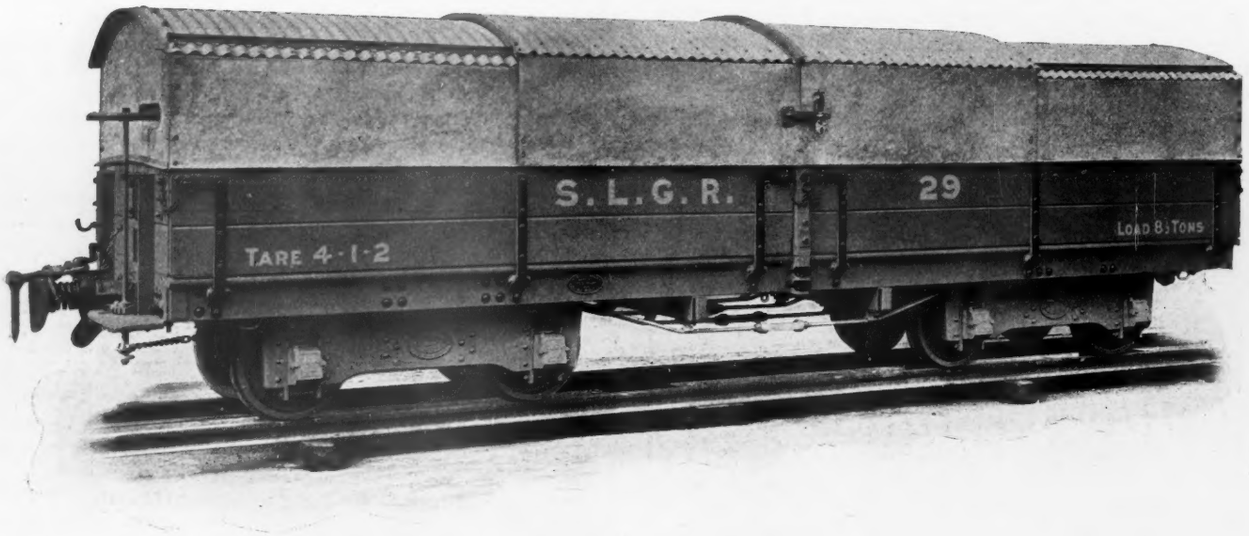


Fig. 7—Open Bogie Wagon Fitted With Sliding Top of Corrugated Iron.

Fig. 8—Composite Corridor Carriage.

Fig. 9—Third Class Car for Native Passengers.

hours, and a hill station was constructed at a height of some 800 ft. above the sea, with beautiful views in all directions. The Mountain Railway was first useful in building the hill station, and now serves it. The higher officials usually secure quarters in the hill and travel down and up daily.

The Mountain Railway is worked by adhesion and has a general gradient up the mountain of 3.33 per cent., but at one point in the town, curve and gradient together are equivalent to 4.54 per cent.

The line is 5¾ miles long, and has one picturesque viaduct on a curve over the Congo stream. (Fig. 10.) The view while descending the Mountain Railway is probably the most picturesque experience in West Africa, as the windings of the line provide constantly kaleidoscopic scenery.

Space does not allow me to deal with the working of the Open Lines Department of the Sierra Leone Government Railway, although the peculiarities of the traffic and the special characteristics of the people justify in some cases somewhat unusual methods.

The general result of building the railway has been a marked increase in the trade done by the colony and the improved revenue. In 1901, when the first section of the railway was opened for traffic, but before its benefits had been felt, the revenue of the colony was £192,000. In 1907 it reached the record figure for the colony of £305,000, and in 1908 it is estimated at £358,000.

In considering the benefit of the railway to the colony it is necessary to take into account the improved methods. The railway considered by itself, as the first line built in British West Africa, working with low rates and suffering from water competition for much of its length, does not yet show the profit to the government that is expected from it at a later date.

A very important result of its construction has been the

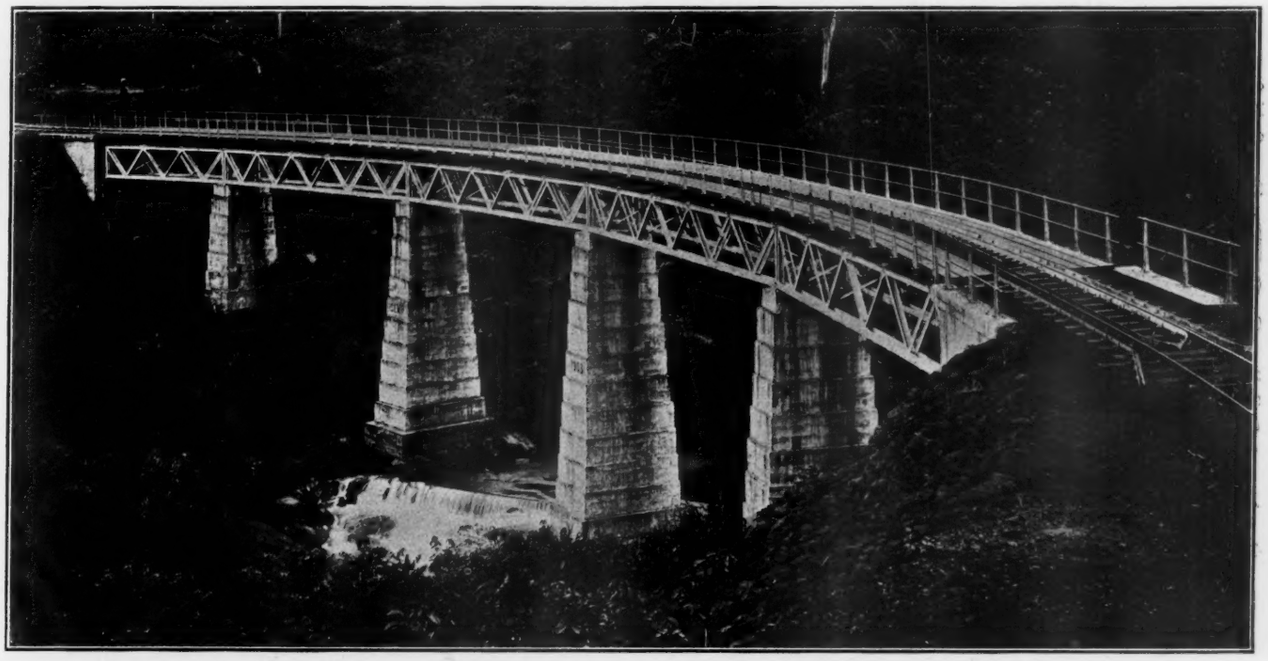


Fig. 10—Picturesque Viaduct on a Curve Over the Congo Stream.

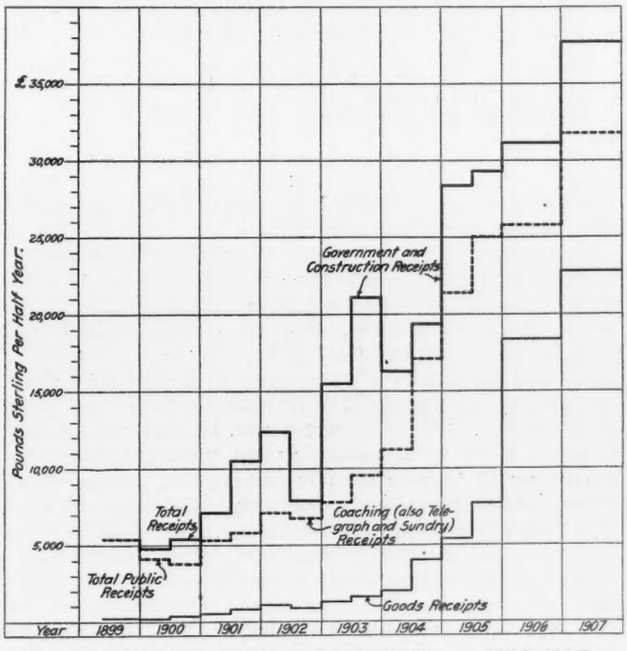


Fig. 11—Receipts of Sierra Leone Railway, 1899-1907.

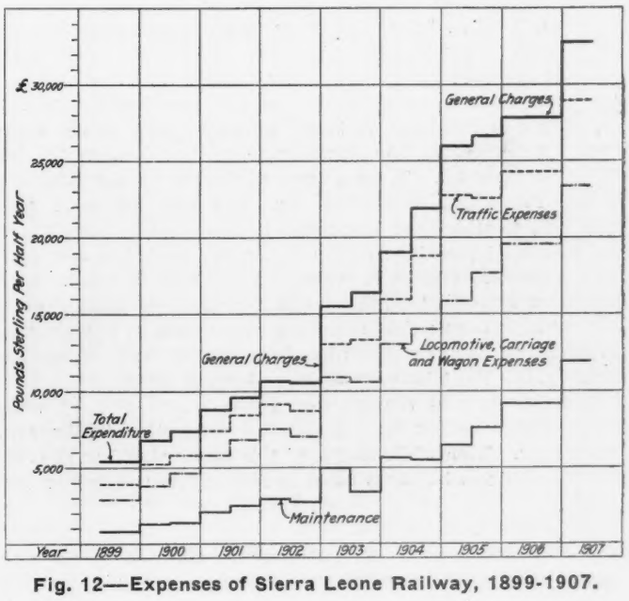


Fig. 12—Expenses of Sierra Leone Railway, 1899-1907.

complete cessation of all native disturbances, although civilization has been brought by the railway to the very doors of formerly hostile chiefs, causing, no doubt, a certain unrest consequent upon necessary changes in old barbaric customs.

A very few years ago the map of the Protectorate of Sierra Leone was little more than a blank sheet of paper in the interior; now, owing to the railway surveys in various directions and the general opening up of the country the map is thickly strewn with names of villages, the very existence of which a short time ago was unsuspected.

The natives of the interior are keen traders and are ready enough when they can be spared from their "farms" to collect rubber, palm oil and kernels for transport by rail and exchange for goods of European manufacture.

The growth of the receipts and expenses is shown by diagrams 11 and 12.

NEW METHOD OF WET EXCAVATION.

Gary, Ind., the industrial city of the United States Steel Corporation, has attracted much attention in the world of engineering, owing to the magnitude of the work, the speed of construction and the methods adopted. With a population of 15,000, Gary is scarcely two years old, yet it has over 10 miles of paved streets; 20 miles of gas mains; an electric light plant and telegraph and telephone service; and a system of sewers, about 20 miles long, is nearing completion. These sewers will cost about $350,000 and about half of this contract was let to Green & Sons Co., general contractors, of Chicago.

This article deals with the methods of the contractor in overcoming the difficulties of the sand, which will flow in from a radius of 15 ft. when an excavation one foot deep is left unconfined. This sand, when dry, is very fine. The land, also, is low as compared with Lake Michigan and in many places there are surface ponds three and four feet deep.

In designating the arrangement of the apparatus, the front end of the sewer trench will mean the end being excavated, while the first, second and third pumps will designate their relative positions in reference to the front end of the sewer trench. The first vacuum pump drains the excavation immediately adjacent to the scraper bucket excavator and has its suction pipe connected to a 4-in. horizontal pipe. The 2-in. well points are three ft. long and connected to each other with 2-in. pipes 13 ft. long, which are jetted in a double row near the center of the trench. This arrangement is adopted so as to allow the sheeting to be driven on either side. The pump draws water from 132 2-in. well points and one 4-in. well point sunk 16 ft. below the pump and one 4-in. suction pipe with strainer, placed on the front end of the horizontal pipe line for draining the surface water. The pumps are all hung by chain falls from A-frames, the first one being mounted on rollers to facilitate its being moved forward as the excavation progresses. The sheeting prevents the others from being so mounted. These pumps are made by the Emerson Steam Pump Co., Alexandria, Va. The 4-in. horizontal suction pipe to which the first pump is connected is made up of six sections joined by flanges. When the work has advanced 22 ft., the rear section is removed and placed in front. Gate valves at frequent intervals make it possible to do this without shutting down; thus the pump can remain in one position even though the excavation has been carried forward approximately 120 ft. The vertical pipes leading down to the well points have ells at the top and a 4-ft. length of hard wire-lined rubber suction hose makes the connection to the 4-in. main pipe. Each 22-ft. length of this latter pipe has 11 cross valves with two bushings each, to accomodate the rubber connection.

After the draining has been carried on for a couple of hours in the first of the six sections attached to the first pump, 2-in. x 8-in. sheet piling, 12 ft. long, is driven on both sides of the sixth section. Excavation is then started by six shovelers and is carried down about six ft. more. It is at this level that the well points attached to the second and third pumps are jetted down another 16 ft., so that they penetrate below the bottom of the lowest excavation and six ft. below the bottom of the sheeting. The second and third pumps have their suction pipes drawing water from the same piping system, each drawing from a 4-in. suction hose straight below the pump and two 4-in. rubber hose leading in opposite directions. This arrangement is accomplished by a 4-way connection in the suction of each pump, about one foot below the pump. The two 4-in. rubber hose, branching off horizontally from the 4-way connection, and at right angles to the trench, are but long enough to connect through a tee with 2-in. horizontal iron pipes, which extend along the sides of the trench just inside the sheeting. It is to these latter pipes that the 1¼-in. well points are connected, and jetted

Second Stage of Gary Sewer Excavation.

down as close to the sheeting as possible so that the excavation can go on without hindrance.

Gate valves placed at frequent intervals, allow considerable flexibility so that the pumping can be made stronger in any part of the excavation where specially large quantities of water may be encountered. Thus the entire combined capacities of the second and third pumps can be concentrated on those well points in the wettest part of the work by closing the gate valves and shutting the vacuum from other points in the trench. This would, of course, be impossible were an ordinary sump used, because as the work progressed, new sumps would have to be dug and sheeted, and additional pumps hung at considerable expense. The distributed suction idea at Gary makes the pumping more efficient than in the old sump method, because the water is only drained from the exact location of the trench instead of from a circular area mostly outside the limits of the excavation and within a certain radius of the sump.

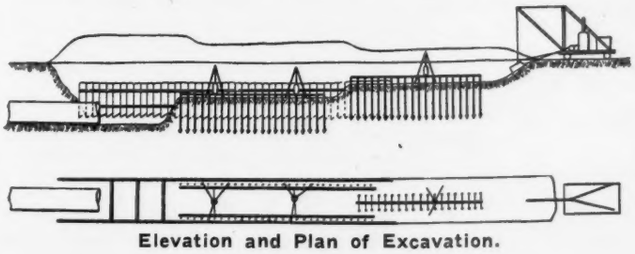
Two men were timed while using a 1-in. pipe for jetting

down the well points. The water pressure was about 100 lbs. per square inch, and the men sunk four 1¼-in. well points 16 ft. deep in one minute. This obviously does not include the time for making connections with main pipes through rubber hose.

The numerous connections between flanges, rubber hose, ells and suction pipes cannot be made absolutely air tight,

Last Stage of Excavation.

and with the high vacuum inside, a considerable amount of air necessarily gets into the suction of the pumps. This fact does not seem to hinder the working of the pumps, owing probably to the large volume of the chambers in which the condensed steam forms the vacuum. It is said that a centrifugal or reciprocating pump could not be used under these conditions without needing frequent priming, on account of the air in the suction. Moreover, the sand which comes in with the water would necessitate frequent renewals of the valves, brasses, etc., a trouble which has not been experienced, as is proved by an uninterrupted run, night and day, for four months. Mr. Sargent, representing the consulting engineers for the work as well as Mr. Green, the contractor, is highly pleased with the novel arrangement and the economy in labor which it is effecting. They say that were shut-downs to occur, enough to cause a delay of even half an hour, it would make the excavation so wet as to become extremely



Elevation and Plan of Excavation.

dangerous to the workmen, and make the costs much higher owing to the unusual fluidity and fineness of the sand.

The amount of air is possibly increased by its entrance through the well points, for when the water is drained from any section, the vacuum at that point still being undiminished, would, under certain conditions, be likely to take in air at that point also. It is interesting to contrast this vacuum method with the pneumatic caisson process of penetrating water-bearing strata. In the latter, compressed air forces the water downward away from the sand or other soil, and the excavation can frequently be carried down below the edges of the caisson. In this new vacuum method, the digging is carried two or three feet below the bottom of the wooden sheeting, showing that the draining of water from below is as effective in this case as is the displacing of the water from above, as in the pneumatic process.

The discharge pipes of the first three pumps empty into a 10-in., tile drain laid in a small trench by the side of the main excavation. This in turn discharges into the completed sewer on the far side of a dam of sand-bags. The amount of water so discharged has not been accurately measured, but it is a rushing stream filling two-thirds of the 10-in. drain pipe, and flowing at a rapid rate, owing to a fall or over 10 per cent. The back-water in the completed sewer is about four ft. deep, and the seepage through this dam as well as that which enters the sewer through other channels, is sufficient to keep a fourth pump working continuously night and day. A temporary manhole was built in the center of the arch, and in this was suspended a pump with a capacity of about 250 gallons a minute.

In speaking of the new method the contractor said that a laborer can handle several times as much sand in a damp state as he could if it were either dry or very wet, as the dry sand falls off the shovel and the wet sand is washed off. It is claimed that if completed at the present rate, there will be a saving of about $40,000, since the excavating gang is working under the best condtions, though 22 ft. below water level and only with ordinary wood sheet piling driven by mauls. Another advantage of the damp sand is that it can be packed, and thus affords a firm bed for the brick sewer invert. After the brick work is completed, pumping in that part of the trench is continued for about half an hour, to insure the proper setting of the cement. To hasten the setting a mixture of Universal Portland and Utica Hydraulic Cement is used in equal amounts. The lowest trench braces were taken out after the invert was completed, and before work was begun on the arch. This was made possible because the sheeting extends one foot below the top of the invert, and is thus held in place. The surface excavation was done with a 2-yd. Page & Schnable bucket excavator, hung from a 40-ft. beam. All of the material removed is practically quick-sand. Some of it was dumped ahead in the path of the machine, thus building a roadbed. Average progress of the bucket excavator was 60 lin. ft. per day, removing about 600 yds. of sand, although as much as 850 yds. has been excavated in one day. The average progress was sufficient to keep in advance of the deeper excavation and the brick work.

The parties engaged in this work were the following: A. P. Melton, City Engineer of Gary; E. N. Scheflow, Assistant City Engineer; Alvord & Burdick, Consulting Engineers and Designers; W. F. Sargent, local representative of Alvord & Burdick, and R. Shackleton, Superintendent for Green & Sons Co.

At a meeting of men interested in transportation on the Rhine, complaint was sent in of the nuisance caused by the smoke of steamers and especially of tugs. Hereupon the steamboat men said that their smoke was nothing compared with that of the locomotives, there being a railroad on each bank of the river. This called out Manager Geyer, of the Palatine Railroads, who said that the railroads had been making great efforts to abate this nuisance, largely for their own interest, as the smoke escaping meant money thrown away. Many locomotives are equipped with so-called smoke-consumers; but it had not been possible to prevent smoke entirely, the demands on the engines varying so greatly, and sometimes requiring forcing combustion to the utmost.

TRAFFIC DENSITY ON THE RAILROADS OF SWITZERLAND.

The accompanying diagram, which is taken from the appendix to the annual report of the Swiss Federal Railways for 1907, is a graphic representation of the traffic density on that system. The numerals indicate the average daily number of trains passing through the different stations, passenger trains being shown by the heavy black lines. The map also shows single and double track sections.

Bale has the densest traffic of any station in Switzerland, with 79.2 passenger and 70.9 freight trains a day. Next comes Zurich, with a record number of passenger trains, the average being 100.5 a day, but only 38.2 freight trains. That Bale is the heaviest freight traffic center is explained by its importance as a junction, traffic being exchanged here with the Baden state lines and the Alsace-Lorraine and French railroads, by which the Belgian manufacturing districts can also be reached.

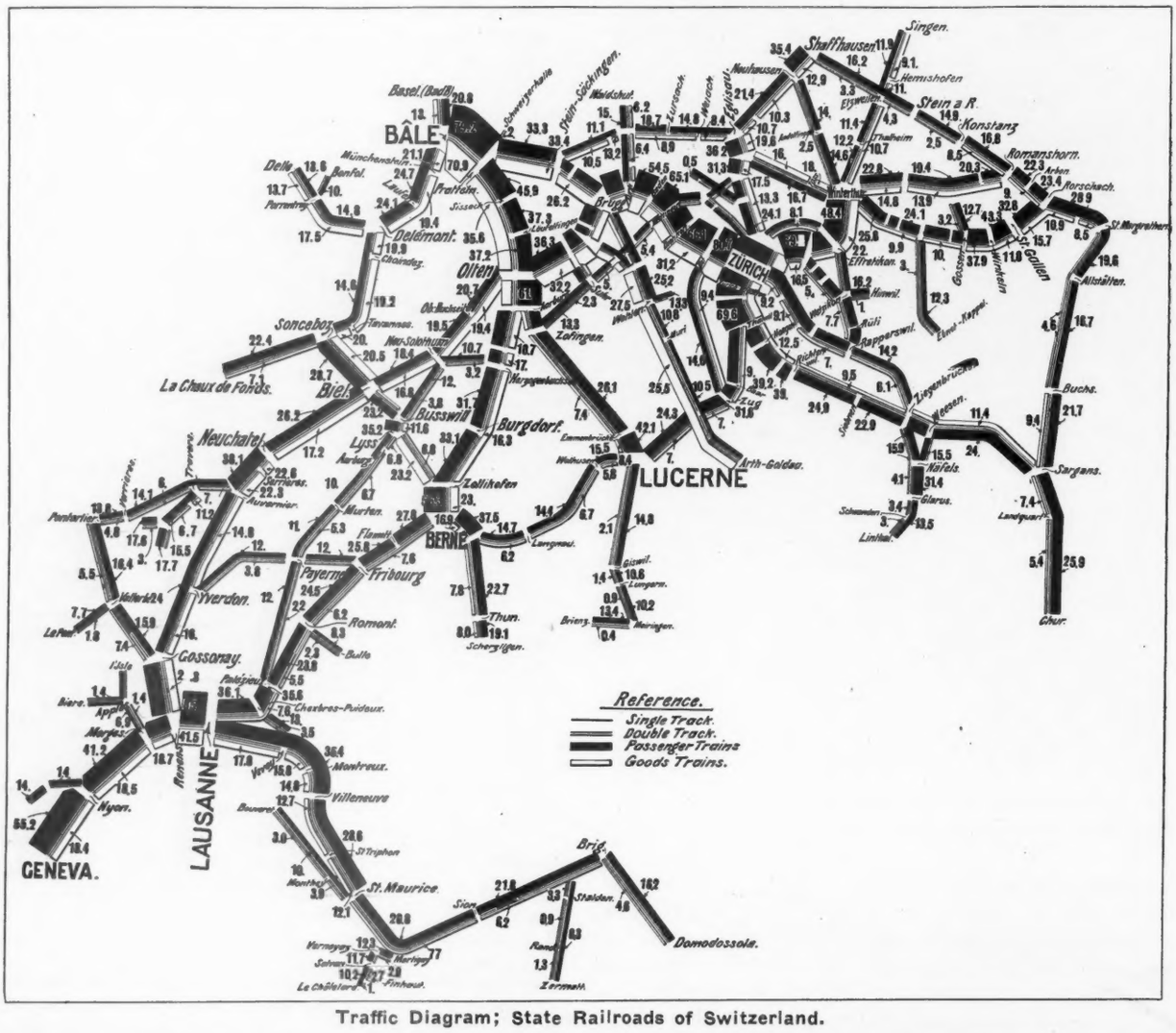
parcel traffic, the total Swiss freight traffic carried last year amounted to 5,554,880 tons. This is what may be called the intra-Swiss business. It was increased to 10,624,725 tons by the addition of the direct traffic with other countries. The "international transit" traffic, i.e., traffic only passing over the Swiss lines on the journey between two other countries, makes a still further addition of about 1,000,000 tons. The following table shows the chief sources of the direct traffic:

	Tons.		Tons.
Southwest Germany	1,309,745	North Germany	652,398
Baden	1,130,482	Austro-Hungary	400,401
France	911,080	Belgium	224,297

The "international transit" traffic, amounting to about 1,000,000 tons, is divided as below:

Between	Tons	Between	Tons
Italy and Germany	743,274	Austro-Hungary and France	62,000
Italy and Belgium	100,000	Italy and England	5,196
Italy and France	65,000		

The total mileage of the Swiss Federal railroads at the end of 1907 was about 1,534 miles. Some 22½ miles of local



Traffic Diagram; State Railroads of Switzerland.

Third in point of traffic density comes Lausanne, where tourist traffic is of chief importance, there being 85 passenger trains a day against 41.5 freight trains. Berne has 56.3 passenger and 23 freight trains daily. At the bottom of the map will be noticed the Brig-Domodossola section. These stations are respectively at the Swiss and Italian ends of the Simplon Tunnel, through which 16.2 passenger and 4.6 freight trains passed daily during 1907.

The geographical location of Switzerland has given its railroads a considerable proportion of through traffic from other countries. Excluding military stores and certain forms of lines, 67 miles of light railway, and the 12-mile section of the Italian State line between Iselle and Domodossola, the Italian approach to the Simplon Tunnel, are also worked by the Swiss Administration. The total receipts for 1907 amounted to 142,934,991 francs ($28,586,998), with a surplus of receipts over working expenditure of 46,484,602 francs ($9,298,920). The ratio of expenditure to receipts was 67.48 per cent., as against 65.8 per cent. for the previous year. Passenger traffic yielded 56,283,797 francs, and freight 80,390,046 francs. The sum of the gross receipts, $28,586,998, divided by 1,546 miles, makes an average per mile of road of $18,491.

General News Section.

At Waycross, Ga., the Atlantic Coast Line has in its yards over 400 switch lamps lighted by electricity.

During the month of August about 3,200 laborers from Mexico passed through El Paso, Texas, on their way northward, expecting to work on the construction of various new railroads.

The Southern Railway is organizing a force of 150 collectors to be employed on passenger trains, the experimental employment of 50 collectors during the last six months having proved satisfactory.

The St. Louis & San Francisco has sent 30 engines to Philadelphia and Pittsburg, 10 to Danville, Ills., and 40 to Moline, Ills., to be repaired, so that there may be no delay in getting them ready for service in the season of heavy Autumn freight traffic.

A press despatch from Winnipeg, September 17, says that officers of the Canadian Pacific report their shops now reasonably manned with competent machinists. They say that to all intents and purposes the strike is broken; but in some small towns where the shops of the company are the only industry, there will still be some difficulty.

A press despatch from Washington says that George Smith, Director of the United States Geological Survey, has invited leading railroad officers to attend a conference to consider means of preventing damage from floods. It is proposed to gather facts concerning the flow of water in streams at different times of the year and to make authentic records of the height, duration and frequency of floods.

Regarding a recent newspaper report concerning the planting of eucalyptus trees by the Mexican Central, an officer of this company writes: "We are contemplating planting some eucalyptus trees, more as an experiment than anything else, and will probably plant 12,000 or 15,000 of them within the next two months. If we find that they are a success in our different climates and soils of Mexico, we shall probably put out a large acreage of them."

The strike declared on July 15 by the boilermakers in the shops of the Cleveland, Cincinnati, Chicago & St. Louis has been ended because the strikers were unable to get boilermakers in the shops of other roads in the New York Central system to go out on a sympathetic strike. The strike was declared because the piece work system was adopted in the new Beech Grove shops of the Big Four. The Beech Grove shops were not involved.

The Lemieux Labor Disputes Act of Canada appears to be popular. It has been invoked within the past week by employees of three different companies: The locomotive enginemen of the Canadian Northern Ontario and two of its affiliated lines; the carmen of the Quebec & Lake St. John, and the carmen of the Quebec Railway, Light & Power Co. The grievances of these men appear to be either too numerous or too vague to be described in the news despatches.

At Lincoln, Nebraska, September 16, the Supreme Court of Nebraska held a surgeon of the Union Pacific guilty of violating the Anti-Pass law of that State. This surgeon received from the railroad company a monthly salary of $25 and an annual pass. The law provides that employees may use passes, but the court holds that a surgeon who, as in this case, has duties which are usually only nominal, is not an employee. To be an employee, one must devote the major part of his time to the service of the company.

It is given out in Washington that the Interstate Commerce Commission will vigorously follow up infractions of the hours of labor law, notwithstanding the objections made by the roads which have entered suits in the courts to enjoin the commission against requiring reports from the railroads of cases where men have worked more than the number of hours permitted by the law. The commission hears that one railroad officer has forbidden all employees to communicate with the Interstate Commerce Commission; and in response to this it is hinted that detectives will be employed, if necessary, to secure evidence of instances of excessive work on the part of trainmen and telegraphers.

The convenience of a depressed track, long used at railroad shops for loading and unloading car wheels, has been made use of by the Wabash for loading and unloading vehicles on wheels at its Fourth street freight station in St. Louis. The pit, which accommodates one car, is at a street corner, enabling end-door automobile cars to be loaded and unloaded as readily as a side-door or flat car. A movable railing is placed around the street sides of the pit, and the vehicles are rolled from the car directly to the street and vice versa. The pit entrance has a 3½ per cent. grade. In addition to its greater convenience as compared to a raised platform, the liability of damage to the freight is minimized.

Steam Omnibuses in London.

The London *Times* of August 12 says that the London General Omnibus Company has in contemplation the conversion of a considerable portion of its fleet of petrol motor-omnibuses to the Clarkson system of steam traction. The generator is of the water-tube type. The boiler consists of a central steel shell forged out of a solid ingot in a 1,000-ton press, this shell being machined inside and out and fitted on its outside with generator tubes in the form of a horseshoe, the top of the shell being inclosed in a removable cover. The whole arrangement of shell and tubes is placed within a casing. The control of the paraffin burner is accomplished automatically, as is also the case with the feed water, the driver being left free for the management of the car in traffic. A considerable reduction in weight of the engine has been obtained, and the motor works in comparative silence. It is claimed that under traffic conditions in London the steam omnibus of this type will work at a cost of 8s. 5d. ($2.05) per mile.—*Consular Report.*

National Association of Railroad Commissioners.

The next meeting of this association will be held at the rooms of the Interstate Commerce Commission, Washington, D. C., on Tuesday, October 6. The secretary of the association is William H. Connolly, Washington.

Traveling on Rhodesian Railways.

For the past month or more I have been traveling over the railroads of Rhodesia. Those already constructed measure something like 2,500 miles, and they have all been built within the last 15 years. They were laid out by Cecil Rhodes, but he died before they had reached the Zambesi and the greater part of his traveling through the country was done in ox wagons. The roads are well built and traveling over them is comfortable. The gage is one meter. The rails are comparatively light, most of them being 40 lbs. per yard. Some of the cars are magnificent. The trains de luxe carry cooking and dining arrangements, and my car to Victoria Falls had a shower bath with a coil of pipe which ran round and round, furnishing a needle spray.

One can now get on a train of that kind at Cape Town and ride to Victoria Falls without change. The distance is 1,600 or 1,700 miles, and the first-class fare is $80. The meals are good and the prices cheap. Breakfast costs 50 cents, luncheon 62½ cents and dinner 75 cents. On the Rhodesian roads the dining car rates are a trifle higher, but nowhere are the meals

as much as $1. For those who wish to travel without regard to cost, private cars may be had. These have cooking and dining compartments attached to them, and a single car has every arrangement to accommodate six persons. It has a dining room, kitchen, bathroom and bedrooms. The railroad company furnishes a cook and all the provisions. The terms are $1,800 a month, which includes board, lodging and travel. This is an average of $10 per person per day, and it seems to me comparatively cheap.

Good traveling arrangements stop with Victoria Falls, although private cars may be brought northward to Broken Hill. I came on the ordinary train and had a first-class compartment all the way. I had to carry my own food and bedding, however. Broken Hill, the present terminus of the Cape to Cairo Railroad is the South African station farthest north and is in the very heart of the black continent. It lies 380 miles above the Zambesi river, and more than a hundred miles from the Kafue river, which is one of the Zambesi's mighty branches. The land here is high and healthy. It is a great plain lying farther above the sea than the average altitude of the tops of the Allegheny mountains. The plain is covered with grass which reaches far above one's head, and is spotted with patches of forest and clumps of brush. The woods are not dense nor are the trees large, but they are the haunts of many wild animals. The country seems rich, and it will some day be taken up by farmers and stock raisers.

Broken Hill itself is a mining town supported by the several hills of zinc and lead.—*From a letter by Frank G. Carpenter.*

Delays to Passenger Trains in New York.

The New York Public Service Commission, Second District, has issued a bulletin showing delays of passenger trains on all or nearly all of the railroads reporting to the commission for the month of April, 1908, the statistics having been sent in under an order issued by the commission last March. Trains not over five minutes late at the end of the run or division are classed as on time. The delays are classified as due to engine failures, other equipment failures, waiting for other railroads, waiting for other divisions, station work, wrecks, condition of track, meeting and passing, storms, trains ahead and other causes. Some of the best items in the record are: Boston & Albany, 90 per cent. of trains on time, average minutes late per train 2.0; Delaware, Lackawanna & Western, 89 per cent. of trains on time, average late 2.3 minutes; Northern of New Jersey, 93 per cent. on time, average late 0.7 minutes; Long Island, 96 per cent. on time, average late 0.4 minutes; Hudson division, N. Y. C., 93 per cent. on time, average late 1.4 minutes. The "average minutes late" is figured on the actual lateness of all the trains, including those which are on time; but the average is inaccurate in that a train six minutes late is counted six minutes late, while one five minutes late is counted 0 minutes late. The poorest records are those of single-track main line divisions doing a heavy traffic, as, for example, the Meadville division of the Erie, 40 per cent. on time, average lateness 24.1 minutes. Most of the poor records, however, are those of light lines on which some of the passenger trains do local freight work. The total number of trains reported was 40,879, and the average delay for each late train (excluding those recorded as on time) was 25.9 minutes. The delays from failures to engines were 11.3 per cent. of the whole; those from station work 12.4 per cent.; those due to delays waiting for connection with other railroads 9.7 per cent. These figures, it will be noticed, refer to the number of delays, not to their duration. The relative importance of the different causes, as measured by the aggregate number of minutes that the trains were delayed by each, is not shown in the report.

Western Railway Club.

The first fall meeting of the Western Railway Club was held in Chicago at the Auditorium Hotel, on the evening of September 15. Joseph W. Taylor, secretary, announced that since the last meeting the club had been presented with the railroad library of the late Everett St. John, formerly General Manager of the Chicago, Rock Island & Pacific and later Vice-President and General Manager of the Seaboard Air Line. The library contains 170 volumes. The secretary also reported that the membership of the club was 1,503.

The subject of the evening was "Car Efficiency," which was discussed by Arthur Hale, Chairman of the Committee on Car Efficiency. An abstract of Mr. Hale's talk is given elsewhere in this issue. Others who took part in the discussion were J. M. Warner, General Manager, Chicago & Western Indiana; T. H. Goodnow, Master Car Builder, Lake Shore & Michigan Southern; F. H. Clark, General Superintendent of Motive Power, Chicago, Burlington & Quincy; W. E. Symons, Pioneer Cast Steel Truck Co.; J. F. De Voy, Mechanical Engineer, Chicago, Milwaukee & St. Paul; T. S. Manchester, Chief Car and Locomotive Foreman, Chicago, Milwaukee & St. Paul.

Dinner to James J. Hill.

James J. Hill, chairman of the Great Northern, celebrated his seventieth birthday on September 16 at a dinner with 70 men who have been for at least 28 years in the continuous employ of the St. Paul, Minneapolis & Manitoba and the Great Northern, which succeeded it. The dinner was held at the Hotel Lafayette, Lake Minnetonka, Minn. On the afternoon of September 16 the William R. Crooks, said to be the first locomotive ever used in Minnesota, was backed into the St. Paul union station. Albion H. Smith, who has been in continuous service on Mr. Hill's railroads since 1868, was engineer, and John H. Lynch, who has been in the service of Mr. Hill's road since 1869, was fireman. The one coach attached to the engine was in charge of W. J. McMillan, a passenger conductor on the Willmar & Breckenridge division of the Great Northern, who has been in the service of the Hill roads since 1879, and assisting him in the capacity of brakeman was Tony Manley, a passenger conductor who has been in the service of the road since 1873. This venerable locomotive was used in hauling Mr. Hill and his party to Lake Minnetonka.

United States Express Dividend.

Two suggestions are made by the minority stockholders' committee, Samuel S. Hatt, Chairman, on which stockholders are asked to give their opinion. It is proposed that shareholders consent to sell one-half of their holdings at $105 a share to persons satisfactory to a majority of the shareholders. The object of this is to take control out of the hands of the present management. The other suggestion is that the company be dissolved and its property and good will sold.

An Excruciating Appeal.

The New York State Public Service Commission's fender tests were continued at Schenectady on Tuesday with the Quinn automatic air-brake fender. It operated with great success on the lightweight dummy, but when pitted against the heavier ones it met with the same fate that has befallen many of the other fenders, the tripping bar becoming bent and other slight injuries resulting. The Weeden trip fender also was tried, the tests on this fender alternating through the day with those on the Quinn fender. On one of the tests with the boy dummy facing the car the fender caught him at the ankles so that his knees bent forward and stuck fast in the interstices of the fender, his body being slightly bent backward so that he appeared to be gazing at the motorman in an attitude of appeal.—*New York Sun.*

Hours of Telegraphers in Emergencies.

The Interstate Commerce Commission has made an informal ruling that railroad telegraphers may, under the federal law regulating hours of service of railroad employees, work in excess of 9 or 13 hours in cases of emergency where trainmen may work more than 16 hours.

An officer of a western line wrote to the Commission suggesting that the law, where it provides that certain operators

may work 9 hours per day and others 13 hours per day, and that in cases of emergency they may be employed four hours additional on three separate days in one week, intended to outline a rule for current practice; and that the provision that the act should not apply "to any case of casualty or unavoidable accident or act of God, nor to where the delay was the result of a cause not known to the carrier or its officer or agent in charge of such employee at the time said employee left a terminal and which could not have been foreseen," and likewise the provision that "the act should not apply to the crews of wrecking or relief trains," applied equally to telegraphers and to trainmen. For example, where a telegrapher was working with a wrecking crew it was suggested that he as well as the trainmen could lawfully be kept at work for an indefinite period.

The ruling of the Commission in reply to this inquiry was that in all cases of emergency or unforeseen casualty to the carrier, the provisions in question would apply to trainmen and telegraphers alike, the services of telegraphers in such circumstances being fully as necessary and impossible of avoidance as those of trainmen.

Centralization and the Interurban Line.

The Interurban railroad scheme is bothering the people of the smaller towns at the present time. We predict that if a few of them are so unfortunate as to get a road, they will be worried more to get rid of it than they are now to secure it. It will mean a centralization of trade to the larger cities, while the smaller towns will be frozen out entirely. Better leave well enough alone.—*Mondamin (Mo.) Enterprise.*

Forestry Experiment Stations.

Forest experiment stations will soon be established by the United States Forest Service in a number of the western states in which there are National forest reserves. As a first step, one experiment station has already been established in the Coconino National forest, with headquarters at Flagstaff, Ariz. It is intended ultimately to have at least one experiment station in each of the silvicultural regions of the West.

At each of the stations model forests typical of the region will be maintained. In the Coconino forest one of the first problems to be taken up will be the study of the reproduction of western yellow pine, which in many cases does not form a satisfactory second growth. Light requirements of different species of trees at different altitudes, effect of forest on temperature, humidity, melting of snow, wind velocity, etc.; relative value of the germinating power of seeds, etc., are among the other studies to be taken up soon.

Lumber Production in 1907.

Figures of the lumber cut in 1907 compiled by the Bureau of the Census and the Forest Service showed the largest total ever reported in the United States, exceeding by over seven per cent. the cut reported for 1906, until then the record year. This does not necessarily show a large actual cut than in 1906, for the returns obtained last year were more complete than ever before. In 1907, 28,850 mills made returns, and their production was over 40 billion feet of lumber. This is believed to include 95 per cent. of the actual cut. In 1906, 22,398 mills reported about 37½ billion feet. But although nearly 29 per cent. more mills reported last year than the year before, these are almost all mills of small individual output.

The South is the region of greatest activity in lumber production, and yellow pine the most important wood, forming 33 per cent. of the entire cut of the country. The cut of yellow pine reported shows an increase of 13 per cent. over that of 1906. In the early part of the year many of the southern mills cut so heavily that, in spite of the curtailed output which followed the business disturbance later, the total was greater than ever before. But in the Lake states and the Northwest a smaller cut was reported than for 1906, though the number of mills reporting increased. In the Lake states the falling off evidenced the waning supply of white pine. Michigan, which for many years led all the states in lumber production, and then gave way to Wisconsin, sank in 1907 from fourth to seventh place, while Wisconsin went from third to fifth. Minnesota as late as 1905 held fourth place. Last year it went from seventh to ninth. It was not until the latter 90's that the south displaced this group of states as the most important source of lumber supply. During 1907 Washington fell off very decidedly from its huge cut of 1906, while Oregon showed a slight increase in its total.

Lumber prices have been steadily going up during the last half century, yet the per capita consumption of lumber has also been increasing. In 1850, according to the best figures obtainable, the average consumption to each person in the country was 250 feet; in 1900, 460 feet; and in 1907, 480 feet.

American Street & Interurban Railway Association.

Convention Bulletin No. 3 has been issued by the American Street and Interurban Railway Association to its members and affiliated and allied associations, giving particulars of the annual convention to be held at Atlantic City, N. J., on October 12, 13, 14, 15 and 16. Two convention halls on Young's million dollar pier are provided for the meetings of the convention and, in addition, meeting rooms are available in the Chalfonte Hotel and the Traymore Hotel. Meetings of the American Association and of the Transportation and Traffic Association are to be held in the Greek Temple near the outer end of the pier. The Accountants are to hold their two sessions on Wednesday at the Chalfonte Hotel, and their Thursday and Friday sessions in the Aquarium Court Hall, near the Boardwalk end of the pier. The Engineers are to hold their Tuesday and Wednesday sessions in the Aquarium Court Hall and their Friday session in the Greek Temple. The Engineers have no Thursday session, that day being set apart for the inspection of exhibits. The Claim Agents are to hold all of their sessions at the Traymore Hotel.

Conditions in the Iron and Steel Trades.

William E. Corey, President of the United States Steel Corporation, is quoted as having expressed the following sentiments at a recent club dinner in New York City:

"In the iron and steel trades the betterment of conditions has been, since the severe setback of last year, slow but steady. Yet no step backward has been made. As to pig iron and semi-finished and crude steel, production and consumption are apparently going hand in hand. Stocks in first hands are small. Within a few days a number of important blast furnaces have been started up.

"Some of these furnaces are so large that, directly and indirectly, they give employment to several thousand men in mining, transportation and the work at the furnaces. Three big blast furnaces just started up after a long inactive period are the principal factors in the support of almost 50,000 men, women and children, whose bread and butter is dependent on the prosperity of these furnaces.

"As our nation's business is firmly founded on the bed rock basis of agriculture served by the very best systems of water and land transportation in the world, it is not remarkable that the effects of the recent severe depression are passing away. Some of the railroads are buying fairly well in materials for maintenance, and steam and electric railroads are expending about $250,000,000 a year for the same purposes."

American Society of Mechanical Engineers.

The season of professional meetings of the American Society of Mechanical Engineers will be opened on Tuesday evening, October 13, by a meeting of the Gas Power Section in the Engineering Societies building at 29 West Thirty-ninth street, New York.

H. L. Doherty, chairman of the Meetings Committee of the section, will present a report for discussion outlining plans for future work, and there will also be a discussion of standards to be used in gas power work. Two papers will be read,

one by E. A. Harvey on gas producer plants, with data upon costs, performance, etc., and one by N. T. Harrington giving the results of tests to determine the loss of fuel weight in a freshly charged producer, due to increase of ash contents in the fuel bed. The first paper will be illustrated by lantern slides, showing actual plants and plans for the arrangement of apparatus.

Electrical Engineering at Ann Arbor.

C. L. de Muralt has been re-appointed Professor of Electrical Engineering at the University of Michigan for the coming year. His lectures this winter will include the discussion of the characteristics and application of a.c. and d.c. motors; the design, construction and operation of electric plants; the principles and methods of transmitting, distributing and controlling alternating currents; the calculation and operation of electric railways, and the management of electric properties, with special references to the commercial aspects of electrical engineering.

Traffic News.

Judge Bouton, in the county court at Bradford, Pa., has decided that the 2-cent fare law of Pennsylvania does not apply to the Buffalo, Rochester & Pittsburgh.

A press despatch, September 19, from St. Johns, N. F., reports that the entrance to Hudson Bay was this year blocked by ice until the last week in July; and there was a good deal of heavy ice in August.

Hearing of evidence on the petition filed by George F. Loftus with the Interstate Commerce Commission, in which he alleged that the rates of the Pullman Company were excessive, has been indefinitely postponed.

The Michigan Supreme Court has rendered a decision sustaining the constitutionality of a law passed in 1872 which fixes a rate of $8 per car for the transportation of freight 10 miles, regardless of the nature of the freight.

The Railroad Commission of Louisiana will give a hearing on October 6 on a proposed rule to provide that all railroads in Louisiana carrying baggage or commercial samples on passenger trains shall allow 24 hours free storage after destination is reached.

The State Railroad Commission of Tennessee has complained to the Interstate Commerce Commission charging that the railroads discriminate against the cotton shippers of western Tennessee, particularly those of Jackson. The number of roads accused is 108.

At Atlanta last week a special examiner of the Interstate Commerce Commission listened for five days to the testimony of five negro bishops, and to that of witnesses brought by them, alleging violation by the railroads of the South of the laws requiring separate and equal accommodations in passenger trains for white and negro passengers.

The railroads entering Salt Lake City have reduced the penalty for diversion of a car en route to a flat charge of $2 if the car is diverted before arrival at first destination or within 120 hours after arrival at first destination. This rule supersedes a rule that fixed a charge of $5 a car for diversion before arrival at first destination or within 24 hours thereafter; of $6 for diversion within 48 hours after arrival at first destination; and of $7 for diversion within 72 hours after arrival at first destination.

The Interstate Commerce Commission has postponed until October 26 the date on which its decision in the Missouri river jobbers' case (Burnham, Hanna, Munger et al. v. C. R. I. & P. et al.) will become effective. The order originally was to have gone into effect on August 25 and an earlier postponement to September 25 was secured by the railroads. A petition for rehearing in the case has been filed by roads running from the Mississippi to the Missouri river that were not parties to the original case, and the Commission has this petition under consideration (see *Railroad Age Gazette*, September 18, page 938). If this petition is not granted the case will be taken at once to the courts.

N. A. Stedman, counsel for a number of Texas railroads, has filed with the State Railroad Commission a brief explaining the position of the railroads as to rules governing baggage. The railroads object to carrying cash registers, adding machines, computing scales and other articles of delicate mechanism as baggage, because they are apt to be damaged. They contend that only such articles as may be required for the personal use and convenience of the passenger may be transported as baggage. Mr. Stedman said that the acceptance of such articles, heretofore, as baggage grew out of the same conditions that initiated the rebate system, and that one of the proper functions of the railroad commission is to interfere with improper railroad practices.

Officers of all the railroads in Texas have signed a statement to the public in which they say that on November 1 they will discontinue the practice of delivering shipper's order shipments on bonds of indemnity before surrender of bill of lading. The railroads say that this practice has resulted in great injury to shippers and great disadvantage to Texas business, and after the date mentioned, surrender of the original bill of lading will be required before cars will be set for unloading. In exceptional instances where the bill of lading may be lost or unavoidably greatly delayed, bond may be taken, in order to avoid unnecessary delay of freight, especially that of a perishable nature, on presentation of affidavits that the loss or detention of the bill of lading has been unavoidable.

At Atlanta, Ga., on Tuesday last three members of the Interstate Commerce Commission took evidence in the complaint against the advance in freight rates of August 1 last on shipments of food products from the Ohio and Mississippi river crossing to points in the Southeastern territory. The complainants had present a large number of merchants and shippers. After hearing some of the testimony the commissioners (Clements, Cockrell and Lane) ordered the Southeastern Freight Association, the Southeastern Mississippi Valley Freight Association, and all defendant companies to produce within two days all letters, telegrams, papers and other correspondence passing between the various roads in regard to the proposed increase since January 1, 1908, or passing between these roads and the associations named. E. H. Hinton, Chairman of the Southeastern Freight Association, was ordered to produce all of the correspondence in his possession bearing upon the proposed increase. The orders are the most far-reaching ever issued by the commission in a proceeding of this kind.

The Illinois Railroad Commission has promulgated a new rule fixing maximum charges for switching. Under the rule previously in effect, the rate for switching a loaded car for three miles or less was 10 cents a ton, with a maximum of $4 per car. For switching more than three miles the roads were permitted to charge the Commission's distance tariff. The new rule, which will become effective on October 1, makes a distinction between "connecting line" and "industrial switching." For connecting line switching throughout the State outside the Chicago district, the new rates will be $2.50 a car when the distance is less than three miles and not more than $3 a car when the distance is less than five miles; and for industrial switching the new rates will be $4 per car when the distance is less than three miles, and not more than $5, when the distance is less than five miles. Within the Chicago district the rates will be as follows: Industrial switching.—Less than 5 miles, $5; more than 5 miles and less than 15 miles, $6; more than 15 miles, $7. Connecting line switching.—Less than 5 miles, $4; more than 5 miles and less than 15 miles, $4.50; more than 15 miles, $5, provided, that for switching grain between elevators, mills, distilleries, etc., less than 5 miles, the rate shall be $3; more than 3 and less than 15 miles, $3.50; more than 15 miles, $4. Immediate switching will be charged $2.50 per car. Forty-eight hours free time is allowed shippers for loading and receivers for unloading.

RAILROAD GROSS EARNINGS FOR THE FISCAL YEAR, ENDED JUNE 30, 1908.
(As reported to the Interstate Commerce Commission.)

Name of road.	Mileage operated at end of year.	Gross revenue from operation												Total, for the year.	Total operating expenses for the year.	Operating ratio, per ct.
		July, 1907.	August, 1907.	September, 1907.	October, 1907.	November, 1907.	December, 1907.	January, 1908.	February, 1908.	March, 1908.	Apr., 1908.	May, 1908.	June, 1908.			
Atch., Top. & Santa Fe	7,102	$6,671,549	$6,693,949	$6,611,185	$7,092,002	$6,598,147	$6,622,530	$6,052,647	$5,594,391	$6,280,620	$6,280,306	$5,671,184	$5,405,872	$75,574,382	$48,100,629	63.65
Atlantic Coast Line	4,367	2,054,190	1,950,997	2,059,243	2,460,410	2,365,278	2,296,083	2,023,464	2,231,525	2,442,023	2,266,534	1,950,338	1,878,966	25,979,052	19,106,123	73.54
Baltimore & Ohio	4,006	7,251,903	7,724,307	7,465,051	7,790,677	6,998,553	5,654,652	5,177,120	4,682,348	5,310,640	5,024,785	5,092,494	5,436,251	73,608,781	54,150,879	73.57
Boston & Maine	2,242	3,752,198	4,065,654	3,789,750	3,871,025	3,438,283	3,077,836	2,784,215	2,491,615	2,883,616	2,882,283	2,908.672	3,045,602	38,990,749	29,354,197	75.29
Central of Georgia	1,913	954,364	965,871	1,046,750	1,245,025	1,130,379	1,012,537	877,107	921,768	961,842	736,527	719,042	811,801	11,383,013	8,504,207	74.71
Central of New Jersey	668	2,033,579	2,089,526	2,037,111	2,080,526	2,084,338	1,898,400	1,745,113	1,481,949	1,504,030	1,978,561	1,946,638	1,735,164	22,614,936	13,161,678	58.20
Chesapeake & Ohio	1,839	2,390,152	2,667,359	2,541,328	2,777,100	2,458,019	2,142,139	1,884,763	1,575,574	1,946,931	1,718,853	1,817,629	1,923,424	25,843,272	17,186,747	66.50
Chicago & Alton	1,105	997,746	1,127,959	1,147,579	1,274,625	1,049,979	973,902	938,206	882,594	1,053,072	834,125	642,699	767,739	10,742,731	7,594,055	62.82
Chicago & Eastern Illinois	957	985,121	1,040,251	1,017,794	1,099,956	1,009,298	892,940	860,847	863,227	1,005,272	557,588	642,699	956,018	12,087,735	7,256,900	67.55
Chicago & North-Western	7,632	5,964,449	6,439,654	6,525,120	7,040,662	5,574,139	4,592,690	4,393,853	4,078,223	4,935,619	4,406,280	4,459,136	4,809,518	63,219,344	41,641,313	65.87
Chic., Burl. & Quincy	9,024	6,893,942	7,553,214	7,892,931	8,270,656	6,764,385	6,147,968	5,766,083	5,205,865	6,255,194	5,686,977	5,567,592	5,743,354	77,748,161	55,268,407	71.09
Chicago Great Western	818	714,212	776,972	741,467	768,568	715,392	631,995	660,643	551,958	654,473	623,779	542,407	593,212	7,975,079	6,762,725	84.80
Chic., Mil. & St. Paul	7,516	5,121,015	5,221,252	5,532,992	5,890,935	5,004,691	4,567,747	4,135,355	3,937,989	4,777,616	4,224,629	4,127,133	4,391,265	56,932,620	37,163,368	65.27
Chic., R. I. & Pacific	7,402	4,761,408	5,314,195	5,332,349	5,563,565	4,611,192	4,551,384	4,238,021	3,947,206	4,530,593	3,990,227	3,801,305	3,962,670	54,604,116	39,655,118	72.62
Chic., St. P., Minn. & O	1,730	1,130,462	1,190,037	1,280,272	1,355,563	1,225,545	1,022,382	956,872	894,542	1,042,033	934,771	900,939	932,275	12,865,694	8,542,489	66.40
Cin., Ham. & Dayton	1,038	798,987	875,891	813,853	821,804	707,707	592,777	573,901	509,173	552,607	520,072	538,646	655,194	7,960,612	6,797,197	85.39
C., C., C., & St. Louis	1,983	2,292,629	2,443,666	2,451,904	2,581,915	2,185,491	1,923,927	1,786,119	1,753,740	1,883,242	1,708,658	1,762,020	1,956,946	24,730,257	19,036,798	76.98
Colorado & Southern	1,248	707,558	625,713	773,116	880,067	878,333	814,218	751,582	631,818	630,104	603,387	577,463	618,172	8,491,532	5,820,639	68.55
Delaware & Hudson	845	1,876,288	1,945,628	1,881,952	1,913,537	1,689,421	1,521,906	1,472,395	1,342,417	1,512,865	1,527,625	1,464,284	1,497,875	19,646,194	11,451,371	58.29
Del., Lack & Western	893	3,027,018	3,265,557	2,998,227	3,214,235	2,931,364	2,701,656	2,518,557	2,288,920	2,414,135	2,605,330	2,955,361	2,889,893	33,810,253	19,622,042	58.04
Denver & Rio Grande	2,501	2,027,337	2,120,262	2,059,321	2,098,196	1,858,378	1,760,527	1,433,123	1,223,008	1,310,319	1,432,772	1,470,890	1,592,298	20,386,431	13,038,809	63.96
El Paso & Southwestern	865	808,844	774,777	788,630	809,948	600,618	643,367	596,689	540,559	535,773	534,501	496,674	529,429	7,564,104	5,278,059	69.78
Erie	1,899	4,230,273	4,327,171	4,010,648	4,046,344	3,660,314	3,203,058	3,016,196	2,748,574	3,251,369	3,113,024	3,275,145	3,717,614	42,599,731	32,701,775	76.77
Florida East Coast	584	165,525	143,882	133,240	149,862	177,927	226,183	270,883	350,957	446,872	394,675	293,725	254,616	3,008,346	2,387,084	79.35
Gal., Harrisb'g & San An.	1,343	950,613	1,039,260	985,403	1,073,301	915,476	960,932	775,109	802,564	814,404	756,432	738,906	744,451	10,556,851	8,379,823	79.38
Great Northern	6,643	5,043,896	5,145,164	5,129,043	6,329,724	6,080,368	4,589,196	3,073,787	2,811,711	3,218,294	3,483,482	3,642,162	3,657,166	54,392,473	36,155,816	66.47
Gulf, Colorado & S. Fe	1,518	874,925	972,598	1,120,140	1,112,268	1,063,675	1,183,803	988,478	899,380	814,111	715,328	665,142	592,105	11,001,953	9,474,546	86.12
Hocking Valley	347	634,939	685,736	675,800	658,936	625,212	438,091	328,834	348,912	446,480	246,595	303,606	448,621	5,841,763	4,083,209	69.90
Houston & Texas Central	789	502,070	553,793	569,113	601,824	531,849	565,793	516,685	424,727	412,003	371,208	349,383	365,633	5,764,080	4,398,012	76.30
Illinois Central	4,594	4,648,354	4,786,501	4,902,589	5,195,291	4,745,485	4,536,605	4,111,566	4,004,473	4,326,196	3,732,629	3,765,704	4,075,033	52,830,427	37,893,479	71.73
International & Great Nor	1,159	571,623	589,333	645,613	687,000	606,217	671,425	569,391	503,390	524,990	496,063	474,737	555,485	6,922,267	6,558,707	94.75
Iowa Central	558	245,611	259,893	300,586	308,091	253,048	251,856	257,611	218,129	259,060	225,405	201,589	221,595	3,002,475	2,128,988	70.91
Kansas City Southern	827	834,142	889,906	890,214	876,076	798,511	669,543	633,234	648,344	699,988	623,726	589,811	605,434	8,758,928	5,754,321	65.70
Lk. Sh. & Mich. Southern	1,508	3,712,430	4,144,504	3,940,459	4,224,970	3,619,076	3,209,355	2,850,440	2,847,587	3,209,662	3,020,209	2,894,301	3,004,390	40,677,384	26,874,570	66.07
*Lehigh Valley	1,452	3,269,042	3,496,604	3,245,306	3,526,233	3,202,789	2,745,930	2,639,720	2,116,331	2,315,894	2,903,519	2,982,167	.....	.....	.....	.....
Long Island	391	1,215,117	1,185,041	963,982	951,631	750,584	596,953	512,443	501,887	611,861	785,622	972,187	993,212	10,040,520	8,054,737	80.22
Louisville & Nashville	4,365	4,126,037	4,426,454	4,189,277	4,548,532	3,912,611	3,358,314	3,299,868	3,253,872	3,548,766	3,271,226	3,259,673	3,425,651	44,620,281	33,594,291	75.29
Maine Central	931	816,190	893,285	857,503	828,150	731,518	597,848	601,356	578,934	670,592	613,017	637,823	688,040	8,514,256	5,919,600	69.53
Michigan Central	1,746	2,341,641	2,433,755	2,464,489	2,766,364	2,295,807	2,023,271	1,861,468	1,727,230	2,019,028	1,949,367	1,850,392	1,923,424	25,656,236	17,830,102	69.50
Minneapolis & St. Louis	1,028	362,814	346,009	373,923	421,140	351,208	313,718	280,932	252,547	306,980	270,063	258,916	288,267	3,826,516	2,648,919	69.23
Minn., St. P. & S. S. Marie	2,310	1,094,890	1,021,935	1,049,134	1,420,546	1,106,256	1,081,117	761,540	680,365	824,118	812,446	736,756	920,753	11,509,857	7,247,002	62.96
Missouri, Kansas & Texas	3,072	2,224,535	2,288,414	2,278,659	2,571,418	2,018,059	1,920,378	1,791,386	1,668,914	1,785,691	1,520,746	1,485,356	1,730,114	23,283,670	16,432,107	70.57
Missouri Pacific	3,492	1,984,103	2,265,960	2,201,741	2,203,698	1,747,866	1,570,861	1,469,750	1,368,690	1,611,602	1,490,744	1,508,993	1,522,603	20,946,611	15,681,002	74.86
Mobile & Ohio	926	908,485	920,762	890,326	1,014,762	857,209	800,398	726,750	666,821	743,695	693,075	697,640	721,621	9,649,212	6,818,003	70.66
Nash., Chatt. & St. Louis	1,230	947,082	984,217	1,042,164	1,024,073	894,533	839,327	871,379	819,650	934,285	801,244	779,263	781,548	10,738,253	8,182,100	76.20
New York Central & H. R.	3,588	8,425,325	8,818,614	8,599,549	8,590,463	7,442,604	7,004,969	6,121,240	5,638,221	6,478,232	6,400,934	6,432,799	6,874,738	86,827,688	65,562,105	75.51
New York, Chic. & St. L.	553	789,736	873,461	867,786	987,367	797,879	848,038	759,986	786,974	868,819	743,780	717,345	632,114	9,673,286	6,545,329	67.66
*N. Y., N. H. & Hartford	2,006	5,029,598	5,350,064	5,000,836	5,196,680	4,747,661	4,172,048	3,679,417	3,359,707	3,874,618	4,149,689	4,132,563	.....	.....	.....	.....
N. Y., Ont. & Western	546	827,147	899,256	693,363	698,976	634,056	553,428	593,987	515,485	607,402	665,358	692,772	740,263	8,121,494	5,418,990	66.72
Norfolk & Western	1,920	2,868,590	3,057,237	2,975,960	3,073,026	2,800,639	2,243,571	1,912,017	1,818,321	2,059,373	1,994,048	2,008,197	2,151,236	28,962,217	18,559,487	64.08
Northern Central	472	1,171,979	1,250,624	1,168,821	1,275,572	1,110,443	961,503	873,608	784,765	894,477	936,840	952,521	941,153	12,322,307	9,665,483	78.44
Northern Pacific	5,649	7,131,465	6,993,785	6,621,785	7,002,719	6,715,672	6,121,550	4,433,812	3,942,718	4,732,115	5,198,052	5,102,004	4,239,807	68,235,484	39,865,033	58.42
Oregon R. R. & Nav. Co.	1,264	1,259,293	1,173,787	1,205,005	1,425,965	1,298,792	1,271,135	987,618	911,780	1,048,697	1,146,202	1,186,441	1,234,988	14,149,704	7,307,476	51.64
Oregon Short Line	1,451	1,598,810	1,541,980	1,459,925	1,594,396	1,584,235	1,288,442	937,016	967,570	1,113,129	1,406,641	1,309,327	1,412,572	16,214,042	7,760,691	47.86
Pennsylvania Company	1,414	4,734,670	5,027,136	4,609,962	5,040,257	4,182,284	2,863,233	2,485,108	2,475,478	2,930,175	2,571,227	2,931,697	3,509,614	43,360,842	29,685,794	68.46
Pennsylvania R. R. Co.	4,066	14,600,047	15,522,360	14,450,800	15,361,120	13,825,534	11,911,317	10,563,378	9,814,909	10,992,225	10,521,899	10,810,189	11,313,151	149,691,929	108,185,759	72.27
Pere Marquette	2,360	1,217,108	1,302,712	1,253,860	1,399,324	1,243,949	1,152,245	1,026,788	852,796	1,142,174	1,068,550	995,824	1,036,545	13,691,876	10,426,791	76.15
Philadelphia & Reading	999	3,625,945	3,928,999	3,744,197	4,131,188	3,742,103	3,313,315	2,885,721	2,570,583	2,901,803	3,035,678	3,116,620	2,882,729	39,878,882	25,458,296	63.84
Phil., Balt. & Wash	714	1,530,001	1,589,155	1,525,248	1,659,813	1,467,283	1,325,789	1,204,565	1,105,482	1,277,608	1,336,515	1,367,428	1,428,698	16,817,586	12,889,957	76.65
Pitts., Cin., Chic. & St. L.	1,472	3,219,323	3,469,296	3,361,363	3,587,334	3,109,479	2,508,645	2,337,659	2,282,776	2,538,043	2,251,464	2,387,879	2,614,579	33,667,840	23,918,459	71.04
St. Louis & San Francisco	4,727	3,227,268	3,458,613	3,334,933	3,508,980	3,033,754	2,659,553	2,544,962	2,466,057	2,718,178	2,378,840	2,255,426	2,318,464	33,905,028	23,411,896	69.05
St. L., I. Mt. & Southern	2,599	1,991,410	2,231,030	2,057,670	2,251,837	1,961,296	1,892,704	1,642,596	1,480,434	1,705,210	1,480,690	1,410,725	1,687,690	21,793,294	14,995,687	68.81
St. Louis Southwestern	1,470	859,566	936,273	943,651	1,033,052	874,191	780,389	721,032	685,439	720,983	656,890	636,181	737,398	9,585,046	7,483,140	78.07
San Pedro, Los A. & S. L.	1,099	688,756	685,724	628,360	764,880	642,105	645,726	569,079	491,565	521,587	621,401	603,568	605,760	7,518,511	5,998,018	79.77
Seaboard Air Line	2,611	1,290,862	1,326,305	1,329,026	1,518,135	1,340,075	1,254,960	1,215,680	1,289,293	1,444,597	1,306,772	1,196,365	1,163,378	15,675,449	11,979,918	76.42
So. Pacific—Pac. System	5,583	7,835,367	7,841,836	7,495,398	7,966,056	7,931,421	7,049,734	5,980,214	5,512,610	6,377,951	6,364,708	6,595,980	6,464,063	82,706,552	52,565,201	63.56
Southern	7,514	4,885,201	5,023,940	5,004,450	5,547,204	4,696,659	4,192,348	3,947,695	3,786,152	4,321,512	3,936,356	3,627,538	3,972,661	52,941,716	39,854,722	75.28
Texas & Pacific	1,885	1,215,346	1,256,730	1,302,075	1,489,492	1,386,379	1,627,902	1,261,841	1,122,999	1,029,439	894,263	847,585	841,433	14,275,484	10,911,204	76.43
Union Pacific	3,301	4,200,474	4,125,391	4,127,806	4,618,839	4,376,003	3,847,217	3,127,511	2,663,659	3,071,598	3,276,890	3,235,090	3,388,552	44,059,030	25,109,347	56.99
Vandalia	829	822,277	910,645	921,924	997,915	814,257	713,621	674,206	648,810	748,279	611,337	615,060	692,308	9,170,639	7,002,091	76.35
Wabash	2,515	2,309,858	2,602,303	2,498,900	2,596,202	2,127,700	2,008,227	2,015,593	1,791,437	1,976,131	1,814,719	1,851,537	2,147,467	25,740,074	18,843,748	73.21
Western Maryland	543	477,297	586,416	542,979	590,733	533,197	469,528	417,114	350,999	394,448	440,876	415,458	429,231	5,648,277	3,589,884	63.56
West Jersey & Seashore	371	728,347	898,698	552,584	747,690	603,031	535,072	526,327	495,232	591,381	549,120	520,819	560,997	7,307,311	5,130,643	70.21
Wisconsin Central	1,023	748,926	728,663	700,044	923,548	949,294	1,021,959	870,818	803,365	877,637	719,811	656,688	599,835	9,580,634	7,844,965	81.88
Yazoo & Miss. Valley	1,371	675,617	741,737	740,324												

*No June report filed.

RAILROAD NET EARNINGS, FOR THE FISCAL YEAR ENDED JUNE 30, 1908.
(As reported to the Interstate Commerce Commission.)

Name of road.	Mileage operated at end of year.	Taxes for the year	Net operating income												For the year	
			July, 1907.	Aug., 1907.	September, 1907.	October, 1907.	November, 1907.	December, 1907.	January, 1908.	1908.	1908.	Apr., 1908.	May, 1908.	June, 1908.	Total.	"Per mile line."
Atch., Top. & Santa Fe...	7,102	$2,789,919	$2,223,155	$2,019,716	$1,984,506	$2,008,832	$1,564,365	$2,054,798	$1,620,321	$1,944,395	$2,550,149	$2,485,894	$1,966,815	$2,260,888	$24,683,833	3.476
Atlantic Coast Line.....	4,367	1,072,052	288,963	235,270	349,274	675,934	608,338	598,418	339,664	566,243	781,799	631,347	448,634	276,991	5,800,877	1,328
Baltimore & Ohio	4,006	2,027,298	2,135,260	2,495,156	2,266,204	2,328,601	1,833,460	920,555	853,742	413,065	993,076	945,968	914,299	1,331,217	17,430,603	4,351
Boston & Maine	2,242	1,712,272	1,019,876	1,382,737	716,036	988,182	648,862	395,687	255,550	207,708	389,091	659,352	670,113	591,085	7,924,279	3,534
Central of Georgia.....	1,913	445,828	208,833	190,706	242,604	375,113	271,147	217,507	164,908	199,225	242,122	88,230	80,288	152,294	2,432,977	1,271
Central of New Jersey....	668	1,365,725	787,343	851,295	785,115	739,841	805,371	754,897	572,691	432,361	362,647	777,904	393,386	524,682	8,087,532	12,105
Chesapeake & Ohio	1,839	791,061	785,481	992,985	880,695	933,547	743,871	504,975	440,686	378,595	604,955	510,084	568,917	520,673	7,865,464	4,276
Chicago & Alton	1,105	356,732	290,025	390,056	413,174	470,160	249,896	275,368	303,448	269,220	457,193	296,249	327,625	394,534	4,136,947	3,745
Chicago & Eastern Illinois	957	358,587	243,707	268,557	260,960	333,512	322,909	249,971	251,354	242,153	377,554	50,637	142,383	383,545	3,127,243	3,267
Chicago & North-Western.	7,632	2,582,823	1,804,397	2,054,478	2,152,633	2,295,205	1,536,522	1,102,678	1,239,874	859,172	1,756,994	1,221,611	1,266,468	1,705,175	18,995,208	2,489
Chic., Burl. & Quincy.....	9,024	2,455,988	2,310,788	2,563,621	2,808,937	2,737,464	1,458,485	1,164,272	1,567,561	1,292,119	2,102,327	507,188	648,267	862,737	20,023,766	2,219
Chicago Great Western...	818	204,000	136,181	177,631	146,909	104,961	93,488	55,371	100,161	2,335	90,027	50,544	12,520†	63,275	1,008,354	1,232
Chic., Mil. & St. Paul.....	7,516	2,304,962	1,884,781	1,931,210	1,998,874	2,247,240	1,402,433	1,450,292	1,140,755	708,859	1,546,195	907,080	788,581	1,457,990	17,464,289	2,323
Chic., R. I. & Pacific.....	7,402	1,693,047	1,036,323	1,461,571	1,624,900	1,690,705	1,029,236	1,098,070	911,932	564,813	1,048,953	746,310	786,287	1,256,850	13,255,950	1,791
Chic., St. P., Minn. & O..	1,730	630,745	301,581	275,130	401,933	398,229	376,630	284,610	326,932	233,092	329,029	256,265	231,699	277,329	3,692,459	2,135
Cin., Ham. & Dayton.....	1,038	302,013	136,610	191,918	161,813	152,570	54,620	28,899†	26,694	8,163†	7,279†	3,356†	18,599	166,275	861,402	830
C., C., C. & St. Louis.....	1,983	791,252	566,793	692,195	750,785	713,658	441,736	2,904	246,548	213,937	312,402	241,801	232,795	486,651	4,902,206	2,472
Colorado & Southern	1,248	238,734	194,317	140,957	252,141	315,712	305,089	244,172	235,621	175,405	141,653	137,914	117,349	171,829	2,432,159	1,948
Delaware & Hudson	845	438,837	679,204	850,016	898,274	934,011	741,016	620,926	481,231	449,283	516,782	508,796	481,826	594,621	7,755,985	9,176
Del., Lack. & Western....	893	1,290,300	1,230,777	1,419,677	1,136,181	1,269,093	1,040,637	1,135,277	874,639	761,885	778,036	913,628	1,146,090	1,191,991	12,897,911	14,440
Denver & Rio Grande...	2,501	750,470	741,400	731,091	659,557	648,650	582,879	572,652	382,111	376,293	402,563	411,897	472,316	615,242	6,597,151	2,638
El Paso & Southwestern.	865	117,982	283,437	215,349	199,480	276,788	118,513	134,699	116,864	151,842	171,699	189,663	139,176	170,554	2,168,063	2,507
Erie	1,899	929,228	1,435,237	1,343,938	980,487	690,173	525,297	314,714	316,992	259,314	753,720	729,763	1,009,755	609,337	8,968,728	4,722
Florida East Coast.....	584	131,593	40,321†	56,452†	32,867†	38,360†	3,148†	49,802	82,987	123,528	168,961	166,375	67,036	2,129	489,669	838
Gal., Harrisbg. & S. An...	1,343	506,339	84,487	156,610	171,766	256,026	132,788	172,973	21,966	90,619	170,485	159,387	100,876	152,706	1,670,689	1,244
Great Northern	6,643	2,292,396	1,852,003	1,922,985	1,840,833	2,566,597	2,174,513	1,204,592	342,969	432,522	757,705	904,148	689,479	489,844	15,944,260	2,400
Gulf, Colorado & Santa Fe.	1,518	377,150	23,032	111,177	265,415	176,379	144,339	200,329	113,889	102,930	54,826	5,556†	42,835†	6,332	1,150,256	757
Hocking Valley	347	224,667	215,789	252,735	265,707	188,243	179,061	29,389	24,857	59,048	121,903	3,847†	17,852	183,148	1,533,887	4,420
Houston & Tex. Central..	789	230,401	90,197	147,965	156,100	154,106	125,364	227,585	113,467	61,036	42,013	38,941	30,430	51,537†	1,135,667	1,439
Illinois Central	4,594	2,190,173	1,038,734	895,178	986,547	1,131,713	1,294,018	1,264,916	945,266	803,202	1,125,305	633,892	1,008,395	1,619,608	12,746,775	2,775
Internat'l & Great Nor....	1,159	278,330	26,639†	7,672	77,587	54,477	21,784	68,987	11,173	44,316†	13,496	29,939†	84,641†	15,588	85,230	73
Iowa Central	558	86,843	63,450	78,081	113,857	116,263	72,145	85,410	85,019	53,362	67,294	26,367	2,555	22,841	786,644	1,408
Kansas City Southern....	827	283,138	295,742	333,996	331,870	268,666	221,439	163,714	169,325	178,520	222,802	196,053	166,554	172,787	2,721,469	3,290
Lk. Sh. & Mich. South....	1,508	1,363,528	1,220,642	1,725,592	1,419,575	1,397,645	1,192,066	632,736	739,019	820,587	945,270	820,589	728,237	797,328	12,439,285	8,250
*Lehigh Valley	1,452	.....	1,273,421	1,379,517	1,140,510	1,265,739	1019,696	643,528	640,910	235,881	642,452	1,190,216	1,264,357	.....	.....	.....
Long Island	391	326,829	363,671	365,871	206,368	187,229	18,861	84,210†	101,674	68,160†	1,209†	175,241	334,757	262,308	1,658,954	4,241
Louisville & Nashville...	4,365	1,393,760	1,034,788	1,247,614	962,915	1,246,918	644,499	264,671	498,723	659,977	833,607	609,218	669,031	960,268	9,632,229	2,206
Maine Central	931	376,067	294,706	316,481	316,575	241,459	230,642	100,377	198,718	80,041	151,203	128,059	91,457	158,871	2,218,589	2,382
Michigan Central	1,746	1,058,776	732,360	780,896	680,061	956,002	561,885	476,985	315,863	283,408	465,331	520,933	447,149	546,485	6,767,358	3.875
Minneapolis & St. Louis..	1,028	167,426	130,353	108,874	143,674	150,455	103,617	91,220	58,939	53,167	103,553	4,445	25,787†	86,660	1,010,170	982
Minn., St. P. & S. S. M...	2,310	696,907	328,853	297,861	328,874	613,948	348,048	433,547	190,235	113,498	253,909	215,847	126,135	315,190	3,565,947	1,544
Missouri, Kansas & Tex...	3,072	688,243	872,520	847,088	808,652	953,814	460,144	486,341	445,489	311,831	364,210	239,591	169,994	203,646	6,163,319	2,006
Missouri Pacific	3,492	895,544	434,430	577,697	471,365	390,732	197,712	149,500	175,793	198,223	407,619	406,981	468,775	491,241	4,370,064	1,251
Mobile & Ohio	926	226,469	229,788	254,772	230,053	330,133	219,468	186,049	166,719	173,767	260,322	189,771	128,044	168,833	2,604,739	2,812
Nash., Chatt. & St. Louis.	1,230	242,740	254,664	211,678	277,973	251,645	181,410	194,008	128,678	115,340	187,308	160,077	138,950	192,394	2,313,413	1,880
New York Central & H. R.	3,588	3,407,016	2,253,074	2,634,452	2,453,967	1,830,658	1,035,509	1,055,185	690,867	571,191	920,508	1,345,826	1,236,465	1,830,864	17,858,567	4,977
N. Y., Chic. & St. Louis..	553	323,437	170,075	242,109	250,542	325,353	174,994	686,243	103,114	134,380	217,153	194,230	185,671	120,655	2,804,519	5,069
*N. Y., N. H. & Hartford.	2,006	.....	1,008,936	1,871,585	1,490,072	878,072	1,309,930	875,222	15,434	386,741	841,453	1,148,283	565,142	.....	.....	.....
N. Y., Ont. & Western....	546	167,971	323,962	399,484	229,571	197,059	169,789	118,180	118,516	71,881	149,140	237,523	252,159	267,268	2,534,532	4,643
Norfolk & Western	1,920	1,020,800	1,038,307	1,079,675	992,357	934,418	851,177	512,176	546,684	537,703	717,873	688,889	700,223	782,447	9,381,930	4,887
Northern Central	472	284,636	238,801	337,403	270,664	311,723	202,668	141,178	100,172	12,947	110,685	199,144	231,401	215,401	2,372,187	5,025
Northern Pacific	5,649	2,717,485	2,913,261	2,802,946	2,479,732	2,967,158	2,937,228	2,642,972	1,511,211	1,331,396	2,036,707	2,078,329	2,018,045	66,020†	25,652,965	4,541
Oregon R. R. & Nav. Co...	1,264	428,968	538,379	488,164	520,843	755,355	711,707	678,133	455,839	343,659	383,481	465,940	542,043	529,716	6,413,259	5,073
Oregon Short Line	1,451	591,129	834,648	733,252	673,342	763,739	821,370	596,310	345,201	392,125	484,560	815,323	723,972	678,379	7,862,221	5,418
Pennsylvania Company ..	1,414	1,615,621	1,542,093	1,800,864	1,481,617	1,665,827	1,073,296	221,340	295,572	405,602	707,456	510,620	954,541	1,400,597	12,059,427	8,530
Pennsylvania R. R. Co....	4,066	2,351,357	4,242,694	5,026,264	4,144,156	4,244,106	3,810,221	2,719,775	2,101,309	1,475,257	2,435,008	2,545,866	3,152,022	3,258,134	39,154,813	9,628
Pere Marquette	2,360	553,239	228,612	306,926	245,331	328,851	230,679	183,861	132,467	40,117†	134,603	121,590	165,508	196,794	2,711,846	1,149
Phila. & Reading	999	755,678	1,398,237	1,569,319	1,404,156	1,640,106	1,339,641	1,084,986	664,520	677,894	911,777	927,768	1,038,422	1,008,231	13,664,907	13,676
Phila., Balt. & Wash.....	714	398,873	336,156	417,044	354,342	430,290	381,769	287,265	134,352	37,484	229,069	285,775	311,846	323,363	3,528,755	4,944
Pitts., Cin., Chic. & St. L.	1,472	1,262,857	802,455	1,011,993	930,876	1,031,973	790,699	366,831	430,220	502,172	723,580	461,107	650,074	784,542	8,486,523	5,767
St. Louis & San Fran....	4,727	889,419	856,635	969,645	819,216	963,840	782,990	612,622	833,233	753,813	895,789	790,366	531,604	793,960	9,603,713	2,032
St. L., Iron Mt. & So....	2,599	635,863	494,374	683,776	520,837	610,684	536,758	555,808	406,503	300,056	592,518	403,440	375,816	681,172	6,161,742	2,370
St. Louis Southwestern...	1,470	293,786	252,113	291,640	276,167	311,284	154,427	134,003	98,487	66,523	110,323	39,898	1,681†	74,936	1,808,120	1,230
San P., Los An. & Salt Lk	1,099	244,663	120,428	142,596	31,266	191,708	123,558	58,737	27,924	3,407	34,041	145,644	196,368	200,153	1,275,830	1,160
Seaboard Air Line	2,611	600,500	207,432	247,230	263,133	386,151	269,745	164,201	233,999	294,720	369,687	260,390	194,963	202,879	3,095,030	1,185
So. Pacific—Pac System..	5,583	2,588,760	3,013,455	2,756,736	2,399,823	2,252,096	2,771,428	2,235,974	1,530,332	1,522,503	2,234,655	2,309,707	2,627,660	2,609,106	27,552,590	4,934
Southern	7,514	2,027,967	806,100	934,153	1,179,113	1,576,629	972,073	764,922	428,646	505,026	1,050,033	962,241	880,545	999,546	11,059,027	1,472
Texas & Pacific	1,885	562,067	262,583	272,889	305,052	392,595	290,577	665,249	239,572	153,259	84,379	42,791	16,627	76,640	2,802,212	1,486
Union Pacific	3,301	1,410,872	1,647,715	1,553,856	1,387,367	1,703,943	1,839,116	1,362,915	987,665	1,005,483	1,327,013	1,500,773	1,487,394	1,735,571	17,538,811	5,314
Vandalia	829	267,013	155,654	211,863	238,952	310,808	145,613	64,864	117,439	143,027	174,855	95,138	103,019	140,302	1,901,534	2,293
Wabash	2,515	727,470	678,616	956,749	809,946	823,491	418,941	410,460	378,235	185,710	276,742	298,437	312,737	618,791	6,168,856	2,453
Western Maryland	543	188,350	153,133	236,689	188,787	208,217	187,155	151,393	125,135	75,405	111,802	160,171	138,459	133,697	1,870,043	3,443
West Jersey & Seashore .	371	243,619	305,174	468,292	147,233	36,132	59,059	12,091	94,473†	73,454†	3,727	80,049	77,662	105,845	1,127,337	3,035
Wisconsin Central	1,023	318,379	284,357	235,431	221,947	238,183	153,488	112,607	84,628	68,449	137,490	112,956	76,018	132,734	1,858,288	1,817
Yazoo & Miss. Valley....	1,371	413,186	5,755	15,124	18,531	157,393	239,831	352,514	210,890	122,622	151,449	33,500	661	14,212	1,322,482	965

* No June report filed. † Loss.

Causes and Sources of Claims.

The stream of loss and damage claims may be likened to a great river. The sources of the stream, the little springs, are the General Managers, the Traffic Managers, the classifications, the rates, the Contracting Agents, the people who ship, who haul the goods, who receive the goods, who load and handle cars, who forward the cars, who receive the cars and the goods. . . . The shippers skimp on barrels, on boxes, on crates. The sugar barrel is not well made; it often is not lined; it breaks; it leaks. The syrup barrel is made of green wood; it hasn't hoops enough. Hot syrup when poured into it absorbs its moisture, the staves shrink; the stuff runs all over creation. Or the glucose ferments, and bursts the barrels that way. The boxes for canned goods and fruit, dried and fresh, are too slight; they look well enough for display, but when it comes to piling 80,000 lbs. into a car, the lower tiers are crushed, or they are sawed to shreds in the oscillations incident to a journey of hundreds of miles. Or they are piled into the ends of the cars and they are toppled over in transit and smashed that way. Receiving clerks should endeavor to plug some of these springs; they should see that the loading by shippers is properly done. That is, they should if they knew themselves, which very often they don't and there isn't any school for teaching such things; should see that barrels are good and, at least, not leaking as they are put into cars; that grain doors are sound and properly fitted; roofs in order; door caps sound; door fixtures in working order and, then, that cars are properly sealed. If sealed before they see them, to have it so stated, and issue receipt strictly as Shippers' load and count. * * * This more particularly of yard clerks and carload shipments. When it comes to the man at the freight house we find that he has charge of from five to a score of doors. He cannot be everywhere. He goes through the motions of checking the items on the tickets. He often signs for what a tricky driver doesn't take out of his wagon. Sometimes drivers "make a sneak," stamp and sign their own tickets and go away without unloading at all. This is all too literally true. This overworked man cannot tell whether a case has shoes in it; he has to take what the ticket says. Maybe the package isn't marked. He don't have to accept it, but he does. He does not observe slight alterations on the tickets. He should refuse all changed tickets—all not perfectly legible; all that have any of a dozen defects which leave them open to question. But how can he coolly scan and criticise with so many demands on him? He does little more than count the packages; sometimes not that. He does not see their marks, and Smith's case is left on his platform where one for Jones appears on the ticket. He adds his outpour to the stream.—*S. D. Webster, St. Louis.*

Traffic Club of St. Louis.

The fourth dinner of the Traffic Club of St. Louis was given at the Glen Echo County Club on the evening of September 15. It was attended by over 300 members and a number of guests. The dinner was informal and no set speeches were made.

Regular Trains on the G. T. P.

The Grand Trunk Pacific was opened for passenger business on Monday last from Winnipeg, Man., westward to Wainwright, Alberta, 666 miles. General Passenger Agent G. T. Bell, in making this announcement, says that the scenic features of the line entitle it to be known as a picturesque route, particularly through the valley of the Qu'Appelle and Assiniboine rivers, and through the Touchwood hills in Saskatchewan. Settlers are already scattered through the territory, and grain elevators have been built at a number of stations. There will be 97 stations between Winnipeg and Wainwright. As some of these stations have as yet no agent, there will be a traveling agent on each train, to attend to the wants of the patrons of the road. With few exceptions, the names of the stations, having been selected by the railroad company, are arranged in alphabetical order throughout each district. The trains for passengers are run so that the trip most of the way may be made practically all in daylight. The district from Winnipeg to Rivers, 142 miles, is traversed on Mondays, Wednesdays and Fridays. Trains over the next district from Rivers to Melville, 137 miles, will run on Tuesdays, Thursdays and Saturdays, and the trains over the third district, Melville to Watrous, 129 miles, on Mondays, Wednesdays and Fridays, and so on. Thus passengers leaving Winnipeg on Monday morning will arrive at Watrous Wednesday evening. In the opposite direction the trains will be so arranged that passengers will arrive at Winnipeg on Tuesdays, Thursdays and Saturdays.

American Association of Traveling Passenger Agents.

The annual convention of this association was held at Seattle, Wash., on September 14 and 15. Those attending were well entertained by the people and railroad men of Seattle. At a dinner given by Alaska-Yukon-Pacific Exposition officials, Gov. Mead, of Washington, was the principal speaker, and A. B. Calder, General Agent, Canadian Pacific, the toastmaster.

The convention adopted a resolution expressing the view that, in order to prevent further business depression and protect railroad employees, an advance in freight rates should be made, and that each member of the organization "should present the railroad side of the question to the public and endeavor to secure its co-operation in bringing about prosperity to all."

The following officers for the ensuing year were elected:

President, M. H. Bohreer, District Passenger Agent, Mobile & Ohio, Chicago.

Vice-President, George W. Andrews, General Agent, Passenger Department, Pacific Coast Steamship Co., Seattle, Wash.

Secretary-Treasurer, Gordon G. Noble, Southeastern Passenger Agent, Lehigh Valley, Philadelphia, Pa.

The meeting next year will be held in Chicago.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Roscoe, Snyder & Pacific, Roscoe, Texas, is in the market for a number of locomotives.

The Denver & Rio Grande has ordered 25 locomotives from the American Locomotive Co. and has an option on 10 more.

The New York, Ontario & Western has ordered six simple mogul (2-6-0) locomotives from the American Locomotive Co., for delivery about Nov. 1.

General Dimensions.

Weight on drivers	150,000 lbs.
Total weight	173,000 "
Cylinders	20 in. x 28 in.
Diameter of drivers	63 "
Type of boiler	Straight top
Working steam pressure	200 lbs.
Heating surface, tubes	2,270 sq. ft.
" " firebox	158 "
" " total	2,428 "
Tubes, number	366
" outside diameter	2 in.
" length	11 ft. 10 "
Firebox, type	Wide
" length	120 in.
" width	96 "
" material and maker	Iron; Tyler
Grate area	80 sq. ft.
Tank capacity for water	6,000 gals.
Coal capacity	10 tons

Special Equipment.

Axles	Cunningham; Carbon Steel Co.
Bell ringer	Sansom
Boiler lagging	Sectional magnesia
Brakes	American driver brake
Brake-beams	Buffalo
Couplers, pilot	Gould
Driving boxes	Cast steel
Headlight	Star, 16 in. square
Injector	Monitor, No. 10
Journal bearings	Cyprus bronze
Piston and valve rod packings	Hayden metallic
Safety valve	Consolidated, encased
Sanding devices	Leach
Sight-feed lubricators	Nathan, No. 9
Springs	Railway Steel-Spring Co.
Steam gages	Ashcroft
Steam heat equipment	Gold
Tires	Latrobe flanged, 5½ in. x 3½ in.
Valves	Richardson balanced
Wheel centers	Cast-steel; Davis patent

CAR BUILDING.

The Wisconsin Central is in the market for passenger equipment.

The Roscoe, Snyder & Pacific, Roscoe, Texas, is in the market for rolling stock.

The Westmoreland Coal Co. has ordered 50 fifty-ton coal cars from the Cambria Car Co.

A. V. Kaiser & Co., Drexel building, Philadelphia, Pa., are in the market for 200 second-hand 40-ton flat cars.

The Columbia & Puget Sound has ordered three passenger coaches and one combination passenger and baggage car from Harlan & Hollingsworth.

The Georgia & Florida is said to have ordered the six passenger coaches and the flat cars mentioned in the *Railroad Age Gazette* on Sept. 4. This item has not been confirmed.

IRON AND STEEL.

The Southern is said to have bought 90-lb. rails to be used on the lines between Birmingham, Ala., and Ensley and Bessemer, to replace 60-lb. rails.

RAILROAD STRUCTURES.

Alpena, Mich.—An officer of the Detroit & Mackinac says that the new passenger station, work on which is to begin early in the spring, will be somewhat similar to the New York, New Haven & Hartford station at Stamford, Conn. Material produced along the road, including paving brick, limestone and cement, will be used.

Billings, Mont.—The loss of the coal docks of the Northern Pacific, which were destroyed by fire on September 12, is estimated at $25,000.

Lethbridge, Alb.—Thomas Kelly & Sons, of Winnipeg, have received the contract for the Canadian Pacific bridge across the Old Man river.

Port Boliver, Tex.—Local reports say that the Gulf & Interstate is to spend about $250,000 in building piers 1,200 ft. long by 360 ft. wide. That company is also dredging a 25-ft. channel alongside of piers and a turning basin at end to be 25 ft. deep.

St. Boniface, Man.—Bids will be received by P. E. Ryan, Secretary of the Trans-Continental Railway Commission, Ottawa, until October 8, for a number of shop buildings.

Taylor, Tex.—It is said that T. J. Freeman, receiver of the International & Great Northern, after a conference with business men of Taylor, has decided that the shops which were recently destroyed by fire are to be rebuilt. Mr. Freeman is quoted as saying that the new shops will be larger than the old ones.

Winnipeg, Can.—The Trans-Continental Railway Commission of Canada, P. E. Ryan, Secretary, Ottawa, will receive bids until October 8 for building locomotive shops. There is to be a building 130 ft. x 800 ft. Separate bids are asked for the sidings required in connection with the preparation of the site for the shops.

SUPPLY TRADE NOTES.

The William J. Smith Co., New Haven, Conn., has appointed Fred Ward & Son, Inc., First and Howard streets, San Francisco, Cal., as its Pacific Coast agent for the sale of Smith one-lock adjustable reamers.

Henry J. Pierce will resign as President of the International Railway, Buffalo, N. Y., on September 29, in order to devote his time to his duties as Vice-President of the Amsterdam Corporation, engineers, New York.

Specifications covering the supply of complete dredging apparatus for dredging the port of Huelva, Spain, are on file at the Bureau of Manufactures, Washington, D. C. (Inquiry No. 2,627.) Bids must be received by the Harbor Board (Huelva) by October 14, 1908.

The Hibner Switch & Signal Co., which was incorporated under the laws of Washington, has its office at 301 Pacific block, Seattle, Wash. An officer of the company writes that patents covering all of the devices invented by Phillip D. Hibner have been obtained for the United States, Canada and nearly all foreign countries.

The Draper Manufacturing Co., Port Huron, Mich., has recently sold pneumatic flue welders to the Grand Trunk Pacific, at Rhea, Man.; the Idaho & Washington Northern, at Spirit Lake, Idaho; the Lima Locomotive & Machine Co., Lima, Ohio; the American Locomotive Co., at Dunkirk, N. Y., and three machines to the New York Central & Hudson River.

M. Gleisner, exporting and importing commission merchant, 2 Stone street, New York, wants catalogues and prices, and samples where it is consistent to give them, of materials and supplies of every description suitable for use on the railroads of Chile. Mr. Gleisner has several branch offices in Chile, and they are to make a specialty of importing American railroad supplies.

H. J. Bellman, of Baeder, Adamson & Co., Philadelphia, Pa., sailed on Sept. 22 with Mrs. Bellman and daughter, to attend the meetings of the International Congress of Refrigerating Industries, to be held in Paris, France, Oct. 5 to 12. After the meetings adjourn, a trip to the south of France and a trip through England are contemplated. He expects to return about Nov. 1.

The Isthmian Canal Commission asks bids at Washington, D. C., until October 12 for guy derricks and hoisting engines, a steam hammer, shop machines, pneumatic tools, car wheels and axles, frogs, switch stands, tie plates, angle bars, track spikes, etc. (Circular No. 468.) The commission also asks for bids until October 16 for two clam shell dredge machines with boilers (Circular No. 469), and until September 28 for three 20-ton locomotive coaling cranes. (Circular No. 469-A.)

The Hayes Track Appliance Co., Geneva, N. Y., recently established a factory at Hamilton, Ont., to make Hayes derails for the Canadian market. The company recently made shipments of Hayes derails to Natal, South Africa, and to Alaska. Among recent installations in this country are those on the tracks of the Hudson & Manhattan to control movements at the terminals, and at the approaches to the Harlem river drawbridge on the New York Central near 138th street, New York.

Edward W. Hodgkins, heretofore of Adreon & Co., Inc., St. Louis, Mo., has become associated with E. E. F. Morrison, under the firm name of Hodgkins & Morrison, with offices at 1811 Third National Bank building, St. Louis, and 209 Western Union building, Chicago. They will continue to represent the accounts formerly represented by Mr. Hodgkins prior to and during the existence of Adreon & Co. Hodgkins & Morrison are ready to take inquiries and orders for any material furnished by the following companies: The Railroad Supply Co., Chicago; Paul Dickinson, Incorporated, Chicago; The Dressel Railway Lamp Works, New York; The Chicago Bridge & Iron Works, Chicago.

The Minneapolis & Rainy River Railroad has bought a 55-ton Vulcan steam shovel for digging gravel ballast at Deer River, Minn. Among other recent sales of the Vulcan Steam Shovel Co., Toledo, Ohio, are: A 65-ton shovel for digging trenches and a 45-ton shovel for backfilling, to John Dowdle, Chicago; a 115-ton and a 75-ton shovel for digging shale for brick making to the Coffeyville Vitrified Brick & Tile Co., Coffeyville, Kan.; a revolving shovel equipped with motors for electric power, to the Union Traction Co., Sistersville, W. Va.; a revolving shovel for digging trenches, to Laurin & Leitch, Montreal, Que.; a revolving shovel for digging marl, to the Lake Shore Portland Cement Co., Sandusky, Ohio, and a revolving shovel and a 32-ton traction shovel for stripping coal mines and loading the coal, to the Laurel Engineering Co., Lily, Ky.

By consent of all the stockholders at a meeting held in St. Louis, Mo., on August 29, 1908, Adreon & Co., Inc., with offices at St. Louis and Chicago, resolved to discontinue business. The Adreon Manufacturing Co., of St. Louis, has been formed by E. L. Adreon, Jr., D. R. Niederlander and William Miller to make and sell railroad supplies. The home office

will be in the Security building, St. Louis, Mo., and Mr. Miller, Vice-President, will have charge of the Chicago office, at 300 Western Union building. He was formerly Superintendent of Motive Power of the Western Maryland, from which position he retired owing to ill health. Having recovered his health, he has decided to engage in the railroad supply business. The company will represent in the Southwest the American Brake-Shoe & Foundry Co., Mahwah, N. J.; the Steel Car Forge Co., Pittsburgh, Pa.; the Pittsburgh Lamp, Brass & Glass Co., Pittsburgh, Pa., and the Acme Pipe Clamp Co., St. Louis, Mo. The company will manufacture on its own account the Campbell graphite lubricator, the Security bell ringer, the Security back-up valve, the Security rail brace and tie plate, and the American gravity coupling for locomotive tenders.

TRADE PUBLICATIONS.

Metal Weather Strip.—A pamphlet of The Frost Railway Supply Co., Detroit, Mich., describes, with detail views, the Detroit metal weather strip for use in passenger coaches.

Measuring Tapes and Rules.—Catalogue No. 8 of the Lufkin Rule Co., Saginaw, Mich., illustrates and describes a large number of measuring tapes and rules, including surveyor's chain tapes and attachments, and metal and wooden rules for all trades.

Locomotive Cranes, Etc.—The McMyler Manufacturing Co., Cleveland, Ohio, has just issued a catalogue of locomotive cranes, bridge conveyors, grab buckets and car dumpers. The catalogue contains a large number of half-tone illustrations of different types of cranes installed for coaling locomotives.

Vertical Boring and Turning Mills.—The Gisholt Machine Co., Madison, Wis., is mailing a leaflet relative to its 52, 60, 64 and 72-in. vertical boring and turning mills. The leaflet, which illustrates and briefly describes the design and operation of the mill, is uniform with bulletins previously issued and is perforated for binding.

Foundry Equipment.—Catalogues Nos. 43 to 55, just issued by the Whiting Foundry Equipment Co., Harvey, Ill., contain a number of illustrations of electric and hand power cranes, pneumatic hoists, cupolas, crane ladles, trucks, turntables, industrial tracks and other foundry equipment. The Whiting cupola is described with detail and general dimension drawings.

Novel Coal Handling Plant.

The McMyler Manufacturing Co., Cleveland, Ohio, recently closed a contract for a large coal handling plant at Philadelphia, Pa. Part of this plant consists of apparatus which takes a boat out of the water, lifts it about 60 ft. in the air, and turns it upside down to discharge the coal. The coal after being discharged may be delivered to other vessels or conveyed into storage. Means are also provided for taking coal out of storage and delivering it into vessels. Provision is made for screening the coal and handling it with minimum breakage.

Western Society of Engineers, Electrical Section.

At the meeting of the Electrical Section of the Western Society of Engineers, Chicago, on the 25th inst., F. A. Sager, of The Arnold Company, Chicago, will present "Notes on the St. Clair Tunnel Electrification," illustrated by stereopticon views.

Loose Pulley Oil Cup.

This device, made by the Lawson Manufacturing Co., Buffalo, N. Y., was designed for keeping loose pulleys constantly oiled while in operation. The cup consists of three parts: a body, a piston or plunger, and an oil-tight cover, all of which are made of a special Swiss brass. The cup is filled with ordinary lubricating oil above the piston. As the pulley revolves, the piston in the cup is driven outward by the centrifugal force, thus forcing the oil through a duct back to the shaft on which the loose pulley revolves. The flow of oil can be regulated according to the speed of the pulley by a screw at the intake opening, and when the pulley is stopped, the oiling ceases. Where this cup is attached to high-speed loose pulleys, a coil spring is inserted directly above the piston to reduce the pressure of the piston on the oil. It is said that this cup need be filled but once a week. The Lawson cup is made in two sizes. Pulleys having a diameter from 6 in. to 12 in. require size No. 1, while those having a diameter of 13 in. or greater require size No. 2.

Improvements on Flat Cars in Panama Canal Work.

Nowhere is equipment subjected to harder usage than on the Isthmus, and as a result many improvements have been made in steam shovels, cars, and other equipment to meet the unusual conditions. Cars used with the unloading plows are an instance. The 40-ton wooden flat car is used for heavy rock transportation, and carries about 18 yds. of material. Eight hundred of these cars were furnished the Commission by the American Car & Foundry Company. They were built up of two 5-in. by 9-in. center sills, four 5-in. by 9-in. intermediate sills, and two 5-in. by 14-in. side sills, each about 40 ft. long and of yellow pine. These sills were floored over with 2¾-in planks running transversely. The car is mounted on two Simplex trucks with 5-in. by 9-in. journals, with steel bolsters, and braced with six long truss rods.

The first order of cars was equipped with one 3-ft. gondola side, and one 1-ft. removable side; but before the cars were put in service the Chief Engineer approved a suggestion that the 1-ft. removable side be displaced by a side extension. This extension was carried on cast iron brackets bolted to the side sill, and it extended the car floor 15 in. The utility of this change was immediately noticed in the increased capacity of the car, and in the dumping of material further away from the trucks.

One of the largest items of upkeep on cars was the cost of renewing and repairing "aprons." Each of the flat cars carries at one end an apron 117½ in. long and 44 in. wide, made of ⅜-in. sheet steel, and so hinged to the car that one edge of it rests on the next car, thus covering the space between the cars in the train and making it possible to run the unloading plow the full length of the train. These aprons were continually being torn off by the plows during the unloading operations at the dumps. This trouble has been obviated by a design of apron hinge and support which brings the apron slightly below the level of the car floor and a little beyond the end of the car. One end of the apron is supported by the forward car and the other rests on cast iron bracket supports bolted to the end sill of the car to which the apron is attached. The hinges were so designed that they offer no obstruction to the moving plow.

As the plow gives considerable side thrust on the gondola side of the car, a special design of high stake-pocket has been made to take up this strain and keep the sides vertical. This stake-pocket runs up on the side stakes about one foot above the sill and the thrust on the pocket is taken up by a 1-in. U bolt running diagonally down from the top of the pocket to the first intermediate sill. Further bracing has been added to bring the thrust on the lower part of the side sill, due to the push on the high side, across the car to the other sill.

A recent improvement is the addition of a "bull nose" to the end of a high side of the car. This "bull nose" is made of ¼-in. steel plate and is so shaped that it surrounds the entire end of the side, and guides the plow from car to car in the train. Before this device was put on the sides of the car it was not unusual for the unloading plow to batter and break the end of a side so badly that the car would be taken out of service for repairs.—*The Canal Record.*

Signal Appliance Association.

Exhibits at the Railway Signal Association Convention, to be held at Hotel Willard, Washington, D. C., October 13, 14 and 15, are to be shown on the tenth floor, rooms 1,002 and 1,003, also the foyer and north end of large ball room. The floor will accommodate a maximum load of 75 lbs. per sq. ft., and the height of ceiling of exhibition rooms is 27 ft. Elevator capacity is 2,000 lbs. and height of elevator from floor to top is 7 ft. The front of elevator opens full width. The management of Hotel Willard absolutely refuse to permit any operation of large exhibits in the hotel. A few exhibits

which would not interfere with traffic may be placed in alley at rear of hotel, as in 1906. Current of 110 volts d.c. might be available for operating a limited number of signal lights in the hotel, but for no other purpose. No alternating-current is available. No gasolene engines will be allowed in or around the hotel.

Exhibits should be shipped in time to reach Washington not later than Oct. 12. All exhibits must be installed and cases and packing removed from floor of exhibit room by 10 o'clock a.m. on Oct. 13, and will remain intact till 3 o'clock p.m. on Oct. 15, when the doors of exhibit room will be closed finally. A suitable force of porters will be furnished by the Exhibit Committee to assist exhibitors in installing exhibits and repacking same for shipment. Tables and chairs will be furnished free.

Arrangements have been made with the Geo. W. Knox Express Co., 1417 Pennsylvania avenue, Washington, D. C., who will look out for shipments, and on their arrival deliver them to the hotel. Shipments should be consigned to shipper, care of Signal Appliance Association, Hotel Willard, Washington, D. C.

Those desiring space for exhibit purposes should make written application to R. A. Paterson, Chairman Exhibit Committee, 640 Hudson Terminal, 30 Church street, New York, specifying number of square feet required, when proper reservations will be made.

High-Speed Drill.

The Hackett drill, manufactured by the Hackett High-Speed Drill Co., West street building, New York, which is shown in the accompanying illustration, is designed to be simple, economical and durable. It is claimed that this drill not only has distinctive merit of its own, but also retains the advantages and overcomes the disadvantages of the drills now in common use. It is made of one piece of flat steel twisted into a skeletonized cylindrical design, which, it is said, saves about 50 per cent. of the steel which would be required for an ordinary fluted drill and reduces the machining to the finishing of the cutting edges. The skin of the forged steel blank is not removed. Temperature strains, responsible for the breakage of many high-speed drills, are said to be eliminated in using metal of a uniform cross section. This fact accounts largely for the strength of this type of drill

Hackett Drill.

Due to the fact that most drill presses, air motors, ratchets and turning and boring machines are equipped with the Morse taper socket, the inventor of this drill recognized that a cylindrical design of shank was necessary to satisfy this condition. It is generally conceded that a taper shank is the only method of securing a perfect alinement of a drill, without which it becomes necessary to stop the machine and place the point of the drill in the center-punch hole. This stopping and starting results in a waste of time. It is also true that the Morse taper shank affords the greatest possible ease of insertion and removal. This becomes especially important, since it is false economy to use a special high-speed tool if it requires more time to place it in the machine than a low-speed tool.

The skeletonized cylindrical design of the taper shank retains the tough hammered surface in the general structure of the drill. The stiffness and strength of the drill increases toward the shank, due to the decreasing pitch of the spiral. By this design it is said the vibration is not permitted to localize in the shank, where the maximum bending moment occurs. The tendency is to bend similar to a leaf spring, which prevents the possibility of crystalization, a result of local vibration. The two forces which act on a drill are torsional and compressive. The Hackett drill is designed to have the spiral take the path of the resultant of these two forces, and in this way to place the steel always in compression, thus affording maximum strength. As the torsional stress is applied, the shank, being unhardened, has a tendency to untwist, thus expanding, adding to the tightness of the fit and removing all strain from the tang. The ordinary solid shank does not have this tight fit, and a slight rupture of either shank or socket will loosen the drill, throwing the strain on the tang.

The hammered surface of the steel in the tang of this drill adds to its toughness and strength, as it does throughout the whole drill. The combination of tightly fitting shank and braced tang of high-speed steel with the great strength should eliminate the danger of twisting off the tang or destroying the socket, a weakness with which mechanics have had to contend for a number of years.

Railroad Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

B. S. Grosscup, Western Counsel for the Northern Pacific at Tacoma, Wash., has resigned.

F. C. Krauser has been appointed Auditor of the Rio Grande Southern, with office at Denver, Colo.

R. N. Paist, Paymaster of the Minneapolis, St. Paul & Sault Ste. Marie, has been appointed Assistant Secretary and Treasurer, a new office.

A. E. Welby, General Superintendent of the Denver & Rio Grande, has been elected Vice-President of the Denver, Laramie & Northwestern, in charge of construction and operation.

Operating Officers.

F. P. Gutelius has been appointed General Superintendent of the Lake Superior division of the Canadian Pacific.

C. E. Shepard, General Yard Master of the Northern Pacific at Livingston, Mont., has been appointed Trainmaster at Livingston. J. L. Botsford succeeds Mr. Shepard.

A. E. Roome, whose resignation as Superintendent of Telegraph of the Southern Pacific was announced in these columns, has been appointed Superintendent of Telegraph, Telephone and Signals on the Pacific Electric Railway.

B. A. Campbell, Trainmaster of the Southern Pacific Lines East of Sparks, with headquarters at Winnemucca, Nev., has been transferred to Ogden, Utah, as Trainmaster, succeeding John McCarty, deceased. Frederick Easton, Roadmaster at Ogden, succeeds Mr. Campbell.

C. W. Buchanan, Chief Train Despatcher of the Indianapolis division of the Cleveland, Cincinnati, Chicago & St. Louis at Bellefontaine, Ohio, has been appointed Trainmaster of that division, succeeding G. F. David, assigned to other duties. W. E. Miller succeeds Mr. Buchanan.

K. A. Easley, Trainmaster on the Choctaw division of the Missouri, Kansas & Texas, with office at Denison, Tex., has been appointed Trainmaster at Parsons, Kan., succeeding E. M. Gates. R. L. Gardener, Chief Despatcher at Denison, Tex., succeeds Mr. Easley. F. P. Blount succeeds Mr. Gardener.

The sleeping, dining and parlor car service on the Canadian Pacific has been divided as follows: Eastern lines—District No. 1, lines east of Toronto, Ont., and Sudbury; district No. 2, Toronto, Ont., to Windsor, Sault Ste. Marie and Port Arthur, inclusive. Western lines—District No. 3, Central division; district No. 4, Western division, including Spokane, Wash.; district No. 5, Pacific division, including Seattle, Wash. H. F. Matthews has been appointed Assistant General Superintendent of districts Nos. 1 and 2, with office at Montreal, Que. S. Wertheim has been appointed Superintendent of district No. 2, with office at Toronto. William Bell has been appointed Assistant General Superintendent of districts Nos. 3, 4 and 5, with office at Winnipeg, Man. N. F. Patterson has been appointed Superintendent of district No. 3, with office at Winnipeg. S. C. Sykes has been appointed Superintendent of district No. 4, with office at Calgary, Alb. H. R. Bain has been appointed Superintendent of district No. 5, with office at Vancouver, B. C.

Traffic Officers.

Thomas Follen, District Passenger Agent of the Wabash at Lafayette, Ind., has resigned.

M. A. Greding has been appointed Contracting Agent of the New York Central fast freight lines at St. Louis, Mo.

W. O. Chears has been appointed Commercial Agent of the Atlanta, Birmingham & Atlantic at Birmingham, Ala.

C. H. Libbe has been appointed Contracting Agent of the Cleveland, Cincinnati, Chicago & St. Louis at St. Louis, Mo.

J. W. Adams has been appointed General Northwestern Agent of the Erie Despatch, with offices at St. Paul, Minn., and Minneapolis.

C. E. Cost has been appointed Traveling Foreign Freight Agent of the Kansas City Southern, with headquarters at Kansas City, Mo.

H. E. Dickinson, Traveling Freight Agent of the Chicago, Peoria & St. Louis at Chicago, has been appointed General Agent at Peoria, Ill.

E. E. Britney has been appointed Traveling Freight Agent of the Cleveland, Cincinnati, Chicago & St. Louis, with headquarters at St. Louis, Mo.

J. W. Kirkland has been appointed Rate Expert of the Alabama Railway Commission, with office at Montgomery, Ala., succeeding J. D. Patterson, resigned.

H. P. Smith has been appointed Soliciting Freight Agent of the Seaboard Air Line at Denver, Colo., reporting to A. H. Stevens, Commercial Agent at that point.

A. E. Duff, General Agent Passenger Department of the Grand Trunk, has been appointed District Passenger Agent of the Grand Trunk Pacific at Winnipeg, Man.

A. J. Blaisdell has been appointed General Agent, Passenger Department, of the Canadian Pacific at Cincinnati, Ohio, succeeding R. L. Thompson, transferred to Toronto, Ont.

W. F. Cody has been appointed Division Freight and Passenger Agent of the Chicago, Milwaukee & St. Paul, with office at Mason City, Iowa, succeeding W. P. Warner, promoted.

R. E. Lawrence, General Agent of the Wheeling & Lake Erie at Wheeling, W. Va., has been appointed General Agent, Freight Department, of the Wabash, with headquarters at Pittsburgh, Pa.

Robert N. Collyer has been appointed to succeed Hudson Fitch as a member of the Working Committee on Uniform Classification and has resigned as Assistant General Freight Agent of the Wabash.

J. H. Whifford, Commercial Agent, and E. L. Satsky, Traveling Freight Agent, of the Missouri, Kansas & Texas at Atlanta, Ga., have been transferred to Chattanooga, Tenn., and their former offices abolished.

J. G. Lowe, Traveling Freight Agent of the Union Pacific at Omaha, Neb., has been appointed General Agent of the Union Pacific and the Southern Pacific at St. Louis, Mo., succeeding L. E. Townsley, resigned.

Hudson Fitch has been promoted from General Freight Agent to Traffic Manager of the Toledo & Ohio Central and the Kanawha & Michigan, and has resigned as a member of the Working Committee on Uniform Classification.

T. J. Barnes, for many years Traveling Passenger Agent of the Canadian Pacific at Chicago, has been appointed Passenger Agent there, succeeding A. J. Blaisdell, transferred to Cincinnati, Ohio, as General Agent Passenger Department.

D. J. Byars, whose appointment as Acting Commercial Agent of the International & Great Northern at Fort Worth, Tex., succeeding R. B. Webb, was announced in these columns September 4, has been appointed Commercial Agent at Fort Worth.

F. E. Clark, Commercial Agent of the Chicago, Milwaukee & St. Paul at Cleveland, Ohio, has been appointed General Agent of the lines in South Dakota, Montana and Washington, with office at Cleveland. C. E. Hilliker, Traveling Freight Agent at Milwaukee, Wis., succeeds Mr. Clark.

F. A. Eisiminger, Traveling Freight Agent of the Toledo, St. Louis & Western and the Chicago & Alton at Atlanta, Ga., has been appointed Commercial Agent of these roads at Birmingham, Ala., and his former office has been abolished. J. A. Fitzpatrick has been appointed Southwestern Freight Agent at Dallas, Tex.

G. R. Browder, Assistant Freight Traffic Manager of the Southern Railway, has been appointed a Member from the South of the Uniform Classification Committee. His former duties are to be performed by Randall Clifton, General Freight Agent, Atlanta, Ga. F. H. Behring, Assistant General Freight Agent at Louisville, Ky., has been transferred to Atlanta, succeeding to Mr. Clifton's duties.

Lucius H. Kentfield, the recently appointed General Freight Agent of the New York, New Haven & Hartford, was born at New Haven, Conn., in 1870. After a high school education at New Haven, he began railroad work in 1886 in the local freight office of the New York, New Haven & Hartford. The next year he went into the Treasurer's office, but two years later returned to the local freight office. In 1893 he went into the general freight office and by 1902 had become chief traffic clerk of the N. Y., N. H. & H. and of the New England Navigation Co., which operates the Fall River Line and other coastwise lines. In 1904 he was made chief clerk in the freight department and two years later Assistant General Freight Agent of both the New Haven and the Navigation company, which office he held until his recent appointment.

Engineering and Rolling Stock Officers.

J. G. Sullivan has been appointed Assistant Chief Engineer of the Canadian Pacific, Eastern Lines, with office at Montreal, Que.

C. C. Smythe has been appointed Acting General Foreman of the Bridge and Building departments of the Chicago, Cincinnati & Louisville, succeeding S. H. Shinn.

C. H. Osborn, Master Mechanic of the Chicago & North-Western at Baraboo, Wis., has been appointed Assistant Superintendent of the Car Department, with office at Chicago.

John Schrader, Night Car Foreman of the New York Central & Hudson River, has been appointed General Car Foreman of the car department, Mott Haven yards, New York.

W. J. Hoskin, Master Mechanic of the Chicago Great Western at Des Moines, Iowa, has been appointed Master Mechanic of the Chicago & Alton, with headquarters at Bloomington, Ill.

E. J. Bohanan, Roadmaster of the Chicago, Rock Island & Pacific at Little Rock, Ark., has been appointed Roadmaster of the Kansas City Southern at Port Arthur, Tex., succeeding J. A. Waller, resigned.

J. A. Allen has been appointed Roadmaster of the Southern Pacific lines east of Sparks, Nev., with office at Ogden, Utah, succeeding Frederick Easton. John Reddy succeeds Mr. Allen. (See Operating Officers.)

G. E. Carson, Master Car Builder of the Pittsburgh & Lake Erie, has been appointed Master Car Builder of the New York Central & Hudson River at West Albany, N. Y. Samuel Linn succeeds Mr. Carson at McKee's Rock, Pa.

R. V. Hogue, Assistant Master Mechanic of the Denver & Rio Grande at Salt Lake City, Utah, has been appointed Acting Master Mechanic at Salt Lake City, succeeding A. H. Gairns, resigned to accept service elsewhere.

W. I. Davis, Roadmaster of the Chicago, Rock Island & Pacific at Haileyville, Okla., with jurisdiction over the Ardmore branch, will hereafter have jurisdiction over the line from Booneville, Ark., to Haileyville, Okla., with headquarters at the latter place. J. W. Guffey succeeds Mr. Davis, with jurisdiction over the Ardmore branch.

E. H. Harlow, Master Mechanic of the First district of the Albuquerque division of the Atchison, Topeka & Santa Fe (Coast Lines), has been appointed Master Mechanic of the Valley division, with office at Richmond, Cal., succeeding A. B. Todd, resigned. W. A. George, Master Mechanic of the Second and Third divisions, succeeds Mr. Harlow, with office at Albuquerque, N. Mex. W. M. Daze succeeds Mr. George, with office at Winslow, Ariz.

J. J. Evans has been appointed Signal Supervisor of the Chicago, Rock Island & Pacific at El Reno, Okla., with jurisdiction over the Choctaw and the Southern districts. F. J. Hemphill, Acting Signal Supervisor of the Illinois division, with office at Ottawa, Ill., will until further notice have jurisdiction over the Missouri division. Charles Hattery, Signal Supervisor of the Kansas division, with office at Topeka, Kan., has been given jurisdiction over the El Reno and the St. Louis divisions.

G. W. Daves, Signal Inspector of the Chicago & Alton, has been appointed Signal Engineer of the Chicago & Alton and of the Toledo, St. Louis & Western, succeeding his father, William Daves, resigned. George W. Daves was born at Cornwall, N. Y., in 1884, and in 1898 started work as a messenger on the Central of New Jersey. Later he went into the signal department and in 1903 resigned to enter the service of the Union Switch & Signal Co., Swissvale, Pa. The next year he went to the Hall Signal Co., New York, and in 1905 was appointed to a position on the Long Island Railroad. In October of the same year he was appointed Signal Inspector of the Chicago & Alton, which position he has held up to the present time.

OBITUARY.

George Beale Whittlesey, formerly Assistant General Freight Agent of the Erie at Chicago, died in that city on September 14 at the age of 51 years. Mr. Whittlesey began railroad work in 1881, and from that year to 1891 was in the employ of the New York, Pennsylvania & Ohio and its successors. From 1891 to 1892 he was Contracting Agent of the New York, Lake Erie & Western, and from the latter year to 1896 was chief clerk in the general freight office. In 1896 he was appointed Assistant General Freight Agent of the Erie, which position he held until a few weeks ago.

James M. Ferris, Second Vice-President and Secretary of the Ohio Central lines, died at his home in Toledo on Sunday last at the age of 71.. Mr. Ferris had been connected with the Ohio Central and its affiliated lines since 1886, when he was appointed General Manager. Seven years ago he was elected Second Vice-President, and his authority extended over the subsidiary lines. Mr. Ferris was born in Ohio and began his railroad service in 1856 as a clerk at Cleveland. In 1865 he went to the Atlantic & Great Western, and with that road and its successors, now a part of the Erie, he served in various capacities until 1886, being Superintendent of Transportation for many years, and later General Superintendent and General Manager.

D. E. Maxwell, General Agent, Operating Department, of the Seaboard Air Line, died at Gainesville, Ga., on September 16. He was born in 1843 at Tallahassee, Fla., and began railroad work in 1865 as cotton and shipping clerk at St. Marks, Fla. By 1871 he had become General Ticket Agent of the Florida railroad, now part of the Seaboard Air Line, and three years later was made Assistant Superintendent. In 1878 he was appointed Superintendent of the Florida Transit & Peninsular, now part of the Seaboard Air Line. From 1897 to 1900 he was General Manager, Purchasing Agent and Vice-President of the Florida Central & Peninsular, the successor company to the F. T. & P. In 1900 he was appointed Superintendent of the Fifth division of the Seaboard Air Line, and in 1903 was made General Agent, Operating Department, which office he held at the time of his death.

Willard D. Murdock, formerly Passenger Traffic Manager of the Mexican Central, died recently at San Antonio, Tex. He was born September 26, 1852, at Zanesville, Ohio. Mr. Murdock began railroad work in 1871, and from that year until 1885 he was consecutively clerk, Agent and Traveling Passenger Agent of the Chicago & Alton. From 1885 to 1886 he was Freight and Ticket Agent of the Missouri Pacific at Wichita, Kan., and then, until 1893, was joint Freight and Ticket Agent of the Atchison, Topeka & Santa Fe and the Missouri Pacific at Wichita. From 1893 to 1894 he was District Passenger Agent of the Atchison, Topeka & Santa Fe and the St. Louis & San Francisco at Wichita. In 1894 he was appointed Assistant General Passenger Agent of the Mexican Central and in 1902 became General Freight and Passenger Agent. In November, 1904, he was appointed Passenger Traffic Manager, which position he resigned in October, 1907.

P. H. Irwin, Consulting Engineer of the Baltimore & Ohio, died at Irwin-on-the-James, Va., September 12. He was born in 1837 at West Chester, Chester county, Pa. From 1852 to 1856, while at school, he spent his summer vacations with an engineering corps on the Westchester & Philadelphia, now part of the Pennsylvania. In 1856 he was appointed Assistant Engineer of the Gettysburg railroad, now part of the Western Maryland. Two years later he was appointed Assistant Engineer and Resident Engineer of the Western Maryland, and by 1861 had become Superintendent. In 1874 he left railroad work to go into the manufacturing business, but in 1879 was appointed Assistant Engineer in charge of the surveys and construction of the Baltimore & Ohio. After this he was, successively, Principal Assistant Engineer, Chief Engineer of Construction of Branch Lines, Acting Chief Engineer and Assistant Chief Engineer. In July, 1905, he was appointed Consulting Engineer, which office he held at the time of his death.

P. H. Irwin.

Railroad Construction.

New Incorporations, Surveys, Etc.

Alberta Northwestern.—Incorporated with $500,000 capital to build from Edmonton, Alb., to the British Columbia boundry at Peace river, via Athabasca Landing, Lesser Slave Lake and Dunvegan; also from Edmonton to the International boundry via Medicine Hat. The offices of the company will be at Edmonton and the directors include D. McArthur, Reaburn, Man.; E. F. Getchell, Chicago; F. G. Foster, Medicine Hat, Alb.; N. D. Beck and E. G. Emery, both of Edmonton.

Alberta Southern.—Incorporated with $500,000 capital stock to build from Lethbridge, Alb., west to the boundary of British Columbia; also from Lethbridge northwest to Calgary; and from Macleod to a point on the Lethbridge-Calgary line, thence easterly to Medicine Hat. There will also be branch lines. Offices of the company will be at Calgary. The directors include I. S. G. Van Wart, R. J. Hutchings and A. M. Grogan, all of Calgary.

Arkansas Roads.—Grading contracts have been let to W. A. Dennison and to L. J. Smith for building about seven miles of railroad from the mill of Moore & McFerren at Ross, Ark., which is on the Jonesboro, Lake City & Eastern, to a connection with the projected Lee Wilson railroad, which in turn is to connect with the St. Louis & San Francisco at Wilson. It is possible that the line now building will connect with the projected Three States Lumber Co.'s line to secure an entrance into Blytheville. C. H. Pulford, of Luxora, Ark., is engineer in charge. (Sept. 11, p. 932.)

Calgary & Kneehill.—Incorporated with $1,000,000 capital stock to build from Calgary northerly to Kneehill creek. Offices of the company will be at Edmonton, Alb. The directors include F. Aylwin, Ottawa, Ont.; P. Roy and J. E. Laurencelle, both of Edmonton.

Canadian Northern.—The Goose Lake branch, to run from Saskatoon, Sask., southwest, has been graded for 50 miles

and has over 30 miles of track laid. It is expected that about 100 miles will be in operation by December.

On the line to run from Saskatoon, Sask., southwest to Calgary, Alb., 300 miles, about 200 miles will be located this fall.

CANADIAN PACIFIC.—An officer is reported as having said that it is the intention of this company to build a line to the Yukon via Athabasca Landing, Alb., and Fort St. John, B. C.

This company is said to have filed plans for the first 25 miles of the road north from Regina, Sask., to Prince Albert, and also plans for a revision of the located line from Bulyea, Sask., to a junction with the Regina-Prince Albert branch, construction work on which is to begin at once.

The line from Moose Jaw, Sask., north has been completed for about 56 miles and train service is to be inaugurated during September, through Belbeck, Tuxford, Marquis, Keeler, Brownlee, Ryebrow and Tugaske. It is intended to continue construction to Outlook this year. Tracklaying has been suspended pending the construction of a number of bridges.

CENTRAL OF GEORGIA.—Surveyors are said to be at work between Cedartown, Ga., and Sprite on a branch which will tap the main line between Rome, Ga., and Chattanooga, Tenn.

CHESAPEAKE & OHIO.—The report of this company for the year ended June 30, 1908, shows work has been finished or is now under way as follows: Second track has been finished and is now in operation as follows: Williamsburg, Va., to Lightfoot, 6.5 miles; Hawk's Nest, W. Va., to Cotton Hill, 2.3 miles; Kanawha Falls, W. Va., to Mt. Carbon, 5.4 miles. Grading and masonry on change of line and second track work are finished between Norge, Va., and Diascund; Jerry's Run, Va., and Lewis Tunnel, and between Maysville, Ky., and Lawrence creek. Work has been resumed on grading and masonry between Gauley, W. Va., and Kanawha Falls and on change of line and second track work between St. Albans, W. Va., and Barboursville. When these improvements are finished the company will have a continuous double-track main line from Clifton Forge, Va., west to Riverton, Ky., 255 miles, with the exception of five short stretches, aggregating 11 miles, where very heavy work will be encountered. During the year, 10.4 miles were added to the Coal River railroad and placed in operation, and 12 miles more are now under construction and nearing completion. Two miles were added to the Raleigh & Southwestern during the year.

COPPER RIVER RAILWAY.—According to reports from Valdez, Alaska, this company is making surveys through that place. It is believed that the company will make Valdez its ocean terminus instead of Cordova, as it is said satisfactory harbor facilities cannot be obtained at Cordova. (July 17, p. 554.)

DES MOINES, COUNCIL BLUFFS & OMAHA (ELECTRIC).—An officer writes that the organization of this company has just been completed. Plans made to build an electric line from Des Moines, Iowa, west via Adel, Guthrie Centre, Audubon, Harlan and Council Bluffs to Omaha, Neb., about 120 miles. J. W. Russell, President, Adel. (See Omaha, Council Bluffs & Des Moines, September 11, p. 933.)

GALESBURG, ALEDO & NORTHWESTERN.—Incorporated in Illinois with $10,000 capital, and office at Galesburg, to build from Galesburg, on the Atchison, Topeka & Santa Fe and the Chicago, Burlington & Quincy, norhtwest to a connection with the C., B. & Q. at Aledo, 30 miles, thence north and west to Rock Island and to Muscatine, Iowa, 50 miles further. The incorporators and first Board of Directors include: L. Weinberg, G. B. Churchill, F. R. Drake, F. W. Latimer, C. L. Hibbard, C. F. Harburgh, B. F. Arnold, T. W. Peterson and L. W. Sanborn.

GRAHAM, ROSSWELL & WESTERN.—Incorporated in Texas with $265,000 capital stock, to build from Graham, Texas, west to Rosswell, N. Mex., about 325 miles. Financial arrangements, it is said, have been made and negotiations with contractors are now pending. At Graham, where connection is to be made with the Rock Island, machinery and repair shops are to be established. The incorporators include: J. E. Morrison, S. B. Street, E. S. Graham, S. R. Crawford and C. W. Johnson, all of Graham; H. P. Fais, of Clinton, Mo., and A. D. Goodenough, of Hereford, Tex.

GRAND TRUNK PACIFIC.—Macdonell & O'Brien, Montreal, Que., have received contracts for building sections 1 and 2, as follows: (1) District C.—From a point near Weymontachene, Que., 196 miles west of the north abutment of the Quebec bridge, which point is on the boundary between Districts C and D, west for about 107 miles. Date of completion, December 31, 1910. (2) District C.—From a point about 107 miles west of Weymontachene, west to the end of the Grand Trunk Pacific contract, about 115 miles. Date of completion, December 31, 1910.

O'Brien & McDougall, Ottawa, Ont., have received contracts for building sections 5 and 6, as follows: (5) Districts E and F.—From a point at the western end of Fauquier Bros.' contract north of Lake Nepigon, Ont., to a point at or near Dog Lake, about 126 miles. Date of completion, September 1, 1910. (6) District F.—From a point at or near Dog Lake, Ont., to a point at or about mile 2.6 west of Peninsula Crossing, by alternative routes as shown on the plans, about 23.76 miles by the northerly route, and 24.13 miles by the southerly route, the selection of the route to be at the option of the Commissioners. Date of completion, September 1, 1900.

Bids will be received at the office of the Commissioners of the Transcontinental Railway, in Ottawa, Ont., until noon of September 28 for sections 3 and 4, as follows: (3) Districts D and E.—From a point at the western end of Fauquier Bros.' Abitibi, Ont., contract, west for about 104 miles. Date of completion, December 31, 1910. (4) District E.—From a point about 60 miles west of the easterly boundary of District E, in Ontario, east to the end of Fauquier Bros.' contract, north of Lake Nepigon, above 100 miles. Date of completion, December 31, 1910. When contracts for these latter sections have been let, the whole line from Winnipeg to Moncton, about 1,804 miles, will be under contract.

Johnson Bros., Brantford, Ont., have been given a sub-contract for work on this line from Plaster Rock, N. B., on the Tobique river, eastward 28 miles.

Announcement is made that passenger service was started Sept. 14 on 666 miles of this road from Winnipeg, Man., west to Wainwright, Alb., which is nine miles east of the Battle river bridge. (See details under Traffic News.)

Grading on the line from Edmonton, Alb., west to the Pembina river, 65 miles, is expected to be finished in October and tracklaying is to be started as soon as the grading is finished.

The Corbet Floesch Co., working on a 50-mile section from Moncton, N. B., has finished grading on 18 miles, with a 6-mile branch to a ballast pit. Tracklaying was started Aug. 17 from Catamount, 11 miles west of Moncton, westerly toward the Canaan river. Tracklaying from Catamount easterly toward Moncton is to be started this month, and it is expected this year to lay 27 miles of track on this section.

GREAT NORTHERN.—The work of ballasting on the Vancouver, Victoria & Eastern from New Westminster, B. C., south to Blaine, Wash., and on the branch from Cloverdale, B. C., east to Huntingdon, three miles south of Abbotsford, is about finished. It is expected that both lines will be opened for traffic at an early date. (R. R. G., March 13, p. 391.)

HALIFAX & GUYSBOROUGH.—Location surveys for this proposed line have been made by the Canadian government from Halifax, N. S., northeast to Guysborough via Lawrencetown, Musquodoboit Harbor, Little River, Upper Musquodoboit and Cole Harbor, 165 miles, also for a number of branch lines. A Halifax syndicate is at present negotiating for the rights and property of the company, to which both the federal and provincial governments have voted subsidies. G. E. Boak, of Halifax, is interested.

HOBART MOTOR RAILROAD.—Incorporated in Oklahoma, with $100,000 capital, to build a number of lines radiating from Hobart, Okla., as follows: One through Kiowa, Washita and Beckham counties, about 80 miles; one through Kiowa and Tillman counties, about 75 miles; one through Kiowa, Washita, Caddo and Canadian counties to Oklahoma City, about 125 miles; and one through Kiowa and Jackson counties to Altus, about 55 miles. The estimated cost of construction and equipment is said to be about $15,000 a mile. The incorporators are: H. H. Hoover, R. E. Nye, Arthur Johnston, A. B. Wey, J. H. Montgomery and J. Slanor, all of Hobart.

LAKE CHARLES & NORTHERN.—This company, operating 25 miles of road from De Ridder, La., south to Fulton, is said

to have finished the extension from Fulton to Lake Charles, 25 miles.

Memphis, Paris & Gulf.—It is said that a contract has been let to T. M. Dodson, Hot Springs, Ark., for building the extension to Murfreesboro. (Aug. 21, p. 788.)

Mexican Central.—Press reports from Guadalajara, Mex., say that the firm of Hampson & Smith has about completed its contract on the Manzanillo extension. It is estimated that the remaining bridge and track work on this extension will require five to six weeks. It is now expected that the line will be opened about Nov. 15. (R. R. G., April 4, p. 591.)

Plans are reported made and bids are to be asked soon for building a cut-off on the Tampico-Aguascalientes line. The new line, which is to run from Micos west to Las Crucitas, San Luis Potosi, will permit the company to abandon a stretch of about four miles of the present road on which there are sharp curves.

Mexican Roads.—A concession, it is said, has been given by the Federal government to Madero Bros., of Parras, Coahuila, to build a connecting line from Camacho, Zacatecas, on the Mexican Central, east to the National of Mexico at Gomez, Farias, Coahuila, 82 miles. Construction material has already arrived at Camacho.

Minneapolis, St. Paul & Sault Ste. Marie.—The report of this company for the year ended June 30, 1908, shows that on account of the financial stringency during the early part of the year the company was unable to provide funds to carry on work on the line from Brooten, Minn., northeast to Duluth, 189 miles; the report says the work will not be finished until 1909. During the latter half of 1907, 50 miles of line were built and an additional 50 miles have since been finished. For this extension and for the acquisition and improvement of suitable terminals at Duluth, money has now been secured by the sale of bonds and capital stock. (July 24, p. 601.)

Quebec & Lake St. John.—Officers of this company recently made an inspection of the proposed route for the extension from Roberval, Que., the present northern terminus on the west shore of Lake St. John, northwest to St. Felicien, 20 miles. Surveys will be started soon, and it is hoped to have the work finished next year.

Rochester, Syracuse & Eastern (Electric).—See Syracuse, Lake Shore & Northern.

Roscoe, Snyder & Pacific.—An officer writes that this company has opened its line from Roscoe, Texas, north to Snyder, 30 miles, for freight and passenger traffic. Work is now under way on an extension from Snyder northwest to Fluvanna, 20 miles. Smith & Herrington are the principal contractors. The company was organized to build from Roscoe north to the New Mexico line, about 200 miles. (R. R. G., April 17, p. 560.)

St. Louis & San Francisco.—About 50 miles of 75-lb. rail is being laid on the central division from Kiamichi, Okla., to Kosoma, and from Fort Smith, Ark., to Jenson. Passing tracks have been authorized on the southwestern division in Oklahoma, two of which are to be laid between Depew and Stroud, and two between Wellston and Luther. The others are between Kellyville and Bristow, Chandler and De Bolt, and Luther and Ludlow.

Savannah, Augusta & Northern.—Local press reports say that arrangements have been made for resuming the construction which was suspended last fall. (R. R. G., March 13, p. 394.)

Stephenville North & South Texas.—According to reports from Fort Worth, Tex., work is to be resumed on the extension from Stephenville north 30 miles to Thurber in Erath county. (R. R. G., March 13, p. 395.)

Syracuse, Lake Shore & Northern (Electric).—An officer writes that this company, operating 23 miles of electric railroad from Syracuse, N. Y., northwest to Baldwinsville, is now building an extension from Baldwinsville northwest to Fulton, about 20 miles, and expects to have the work finished and the line in operation early in December of this year. Regarding the extension from Fulton northwest to Oswego, about 20 miles, particulars are not yet ready, as the route has not been selected, or the date of construction decided on. This also applies to the reported extension of the Rochester, Syracuse & Eastern from Port Byron east to Syracuse, about 35 miles. At the present time both of these projects are very indefinite.

Valdez-Yukon.—Leopold Hirsh & Co., of London, England, are said to have acquired the properties of both the Valdez-Yukon Railroad, projected from Valdez, Alaska, northwest to Eagle City, 412 miles, and on which more than 10 miles has been graded, and the Alaska Consolidated Copper Co., of which former Judge W. F. B. Stewart is President and A. F. Stewart, Treasurer, both of York, Pa. It is said that the new owners will develop the coal and copper fields and build a line 120 miles long in Alaska.

Vancouver, Victoria & Eastern.—See Great Northern.

West Virginia Connecting.—Rights of way, it is said, are being secured, and surveys have all been made for a line from Belington, W. Va., north via Waynesburg, Pa., to Carnegie, near Pittsburgh, about 120 miles. The company was incorporated about two years ago to build from Belington north to Waynesburg, 68 miles. D. F. Maroney, of Pittsburgh, and J. V. Thompson, of Uniontown, are interested.

Wichita Falls & Northwestern.—The J. E. Kirk Construction Co., Oklahoma City, Okla., is said to have been awarded a $200,000 contract for the construction of 20 miles of this road from Randlett, Okla., to Emerson. It is said that the route of the road north from Emerson is undecided at present and will depend on the action of the people of Lawton regarding the bonus asked of them.

Railroad Financial News.

Canadian Pacific.—It is said that this company has bought the Alberta Railway & Irrigation Company's property in South Alberta for $2,000,000 and intends to make the Crows' Nest Pass route its main freight line to the Pacific Coast.

Chicago Great Western.—The receivers have been authorized to pay $116,220 interest due October 1 on the $5,811,000 first mortgage 4 per cent. bonds of the Wisconsin, Minnesota & Pacific.

The entire capital stock of the Wisconsin, Minnesota & Pacific is owned by the Chicago Great Western and it is to protect this stock that the receivers are authorized to pay the interest on the W. M. & P. bonds.

Denver & Rio Grande.—(See Western Pacific.)

Philadelphia Rapid Transit.—The stockholders have authorized an issue of $5,000,000 bonds, secured by a 999 years lease of the subway and elevated lines and by the stock of the Market Street Elevated Passenger Railway. The cash realized by the sale of these bonds is to be used for new pay-as-you-enter cars and other equipment.

Second Avenue (New York).—Judge Lacombe, in the United States Circuit Court on September 17 denied the application for the appointment of a separate receiver. The property is now in the hands of the receivers of the Metropolitan Street Railway, Messrs. Robinson and Joline.

Western Pacific.—The directors have authorized the sale of enough second mortgage 5 per cent. sinking fund bonds of 1908-1952 to finish building the main line from Salt Lake, Utah, to Oakland, Cal. The bonds, which are to be sold to the Denver & Rio Grande at 75, are part of an authorized issue of $25,000,000. The D. & R. G. sold some time ago to Blair & Co., New York, $10,000,000 of its own 3-5 year 6 per cent. convertible notes. The notes are of August 1, 1908-1911, but at the option of the railroad may be extended to 1913 on payment of 2 per cent. in cash to the holders. They are part of an authorized issue of $15,000,000.

Wheeling & Lake Erie.—A petition has been filed in the United States Circuit Court to foreclose the mortgage securing $12,000,000 general 4 per cent. bonds of 1905-1955 held as collateral for the $8,000,000 notes that matured Aug. 1. (August 7, p. 694.)